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Lighting of Show Windows and Show Cases

General Considerations, Lamps, Reflectors, Intensities, Color and Direction of Light—Present Practice in Window Display Lighting—Show and Wall Cases—Layout for Demonstration Window

By A. L. POWELL

Edison Lamp Works of General Electric Co.

The enormous advertising value of the show window is not to be doubted. Every progressive merchant realizes it, and huge sums of money are spent for window display. Any one walking along the sidewalk during the day will stop to look at a striking display; at night the window display not only attracts, but the contrast of the brightly lighted area against the relatively darker portions of the building compels attention.

The show window of the store represents a relatively large investment, and its fixed charges are heavy, in that its space is taken from the store area, and, of course, the rent is figured on the total square feet occupied. A statistical expert recently reported some tests as to the value of window space to a store. Among other items, he reached the conclusion that the space devoted to a show window is worth a surprisingly large proportion of the rental value of the entire store. In one store, more than 100 ft. long, the windows, only 2 ft. deep, proved to be worth 12% of the rent asked for the whole place.

It is axiomatic that the more hours per day a shop or any equipment is used the less proportionately become the fixed charges. Therefore, from an economic standpoint the valuable show window should be utilized every possible moment. If when the sun sets the show window becomes useless to the proprietor, he is actually losing money every hour there is any one on the street. Fortunately, however, there is no necessity for the display to become valueless at night-

A Pleasing Display Well Illuminated by Mazda C Lamps in Mirrored Reflectors Along the Upper Front Edge of the Window; A Neat Valance Conceals the Mechanism of the Lighting.

fall, for the modern methods of supplying light cause the goods in many instances to appear even better than by natural light. The cost of proper window illumination is such a small item in comparison with the expense of merely having the window available that it can almost be neglected.

As a result of wide publicity on the general subject of window illumination, the standards have been constantly rising and window illumination has improved remarkably in the last few years. No longer does the well-posted display man decorate the window attractively and then have it spoiled by improper lighting.

General Considerations.

Beyond a doubt the show window is a miniature stage, and the display man a scenic artist and stage director. He sets his scene, then places his actors and properties. He can learn much with regard to artificial lighting from the stage manager by the manner in which the latter uses light in the theater.

The stage manager never annoys the audience or distracts its attention by permitting bright

A Row of Light Sources in a Corner Window Is Particularly Objectionable; They Should Be Concealed.

lamps to be visible. The storekeeper should make it possible for the person on the sidewalk to view his display with equal comfort. It is true that on the stage, if it is desired to blind the audience during a magician's act or change of scene, lamps are located around the edge of the stage with reflectors to throw the light in the eyes of the assemblage. A window outlined with light sources gives a similar effect.

Of course, there is no rule to which there are not exceptions. Occasionally on the stage we find a room "set" where a hanging fixture, bracket lamps or fireplace are part of the furnishings, but you will notice that the ingenious stage manager never permits these to be very bright. Similarly, in a show window one or two fixtures with small lamps are permissible to carry out some decorative scheme.

Another case is a cafe window, cheap jewelry store window, or the like, where it is often desirable to place a fairly bright light in view to attract attention, but in these instances there are seldom any goods which the proprietor desires the public to examine closely and critically.

The lamps to light the display should never be in view, for the store is selling merchandise, not electric light or fixtures. The thought of the manner in which the window is lighted should never enter the casual observer's mind.

On the stage the mechanism of the lighting, the border lights, footlights, floodlights and spotlights are always masked or concealed from view. The window lighting equipment should be hidden with a drapery or other valance.

Lamps and Reflectors.

The electric incandescent lamp has become practically the standard illuminant for show-window lighting. It does not damage the goods or cause strong currents of air which deposit dust. There are no products of combustion to introduce moisture in the window, which often affects the display and in winter forms frost on the glass. Incandescent lamps and reflectors can be readily concealed.

The natural distribution of light from the incandescent lamp is about equal in all directions; hence to get the full benefit of the light all lamps should be equipped with proper and efficient reflectors, directing the light on the goods rather than allowing it to illuminate the ceiling of the display space or escape to the street. In a theater the electrician does not waste a lot of light up in the flies or out in the auditorium, but provides each lamp or group of lamps with reflectors to utilize as much as possible of the light.

There are many types of reflectors suitable for window lighting which have been especially designed for this service, and so constructed as to give the correct distribution of light for windows of various dimensions. The typical show-window reflector is what is known as the angle type, sending the light down and to the side rather than straight downward. Tests and experience have indicated that individual prismatic and mirrored glass reflectors are best suited for window lighting. They accurately control the distribution of light and are of high efficiency.

Intensity of Illumination.

The illumination necessary to properly show off the goods in a display will depend to a certain extent on the color of the goods. It is a well-known fact that we see things by the light reflected from them to the eye. It is evident that a window with white or light colored goods will send back to the eye a great deal of the light falling on them, while one containing dark goods will reflect but little light and hence appear dim if not well lighted. If the window is likely to have goods of all kinds on display it is necessary to plan the illumination so that the most difficult condition is fulfilled.

In addition to the above consideration as to the amount of light required to properly illuminate the window, there are a number of variable factors which will also affect the result; for instance, the location of the street. If in the center of the town surrounded by lighting of a high intensity from the street lamps and adjacent signs, proportionately more light will be necessary to make the window stand out prominently than if it were on a side street or in the outlying portion of the city. In general, the size

of the city will have some bearing on this question, for in most cases the larger the city the higher the standard of illumination. The depth of the window will also have a bearing on the size of the lighting units, for in a deep window there is a greater area to be illuminated than in a shallow window. The type of reflector used is also important; the more efficient the reflector the greater the amount of light reaching the goods from each lamp. The following table indicates the desirable watts per running front foot of window, using Mazda C lamps equipped with efficient reflectors. This is, of course, based on average figures, and in applying these values local conditions may affect the result. For example, some small town may be very brightly illuminated, and in this case the windows really go in the next larger class of cities. These figures are based on common practice for the center or business portion of the town, and in outlying parts somewhat lower values may be permissible.

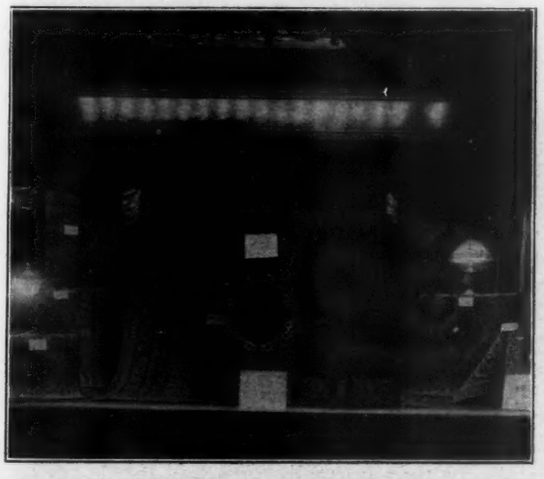
WATTS PER FRONT FOOT FOR WINDOW LIGHTING.

Size of City or Town.	Depth of Window in Feet.	Watts per Front Foot.
Up to 5,000	2-4	25
Up to 5,000	4-8	25
Up to 5,000	Above 8	30
5,000 to 25,000	2-4	30
5,000 to 25,000	4-8	35
5,000 to 25,000	Above 8	50
Above 25,000	2-4	40
Above 25,000	4-8	60
Above 25,000	Above 8	75

Some merchants vary the intensity of light for different displays by substituting smaller lamps as occasion demands. A much more convenient scheme is to wire the window with two or more circuits, and eliminate every third lamp when light displays are used and have the maximum illumination for a dark dress.

Color of Light.

The show window is designed primarily to attract the crowd and compel its attention. Startling, novel features are in this respect an asset, yet it is not good taste to use methods which



Note the Dense Shadow Cast by an Overhanging Beam in This Poorly Designed Window.

make the display garish. Artificial light is one of the best means at the disposal of the display man to produce the desired effect. The possibilities in the way of colored lighting have not yet been fully appreciated. Most windows are still lighted with approximately the same kind of light that has been in use for many years. As pointed out before, the display man is in reality a miniature stage director, and he has, therefore, something to learn from Belasco, Urban and Rhinehart. These great artists of stage direction

Clear Glass Above the Background Admits Daylight to the Store Interior, but Each Light Source Is Reflected from This Unless a Curtain or Shade Is Provided Which Can Be Drawn at Night to Cover This Glass.

do not confine themselves to the unmodified light from the incandescent lamp, but use all colors of the spectrum. They obtain such colors by the use of gelatin screens or superficially colored lamps.

Colored window lighting was first brought to the general attention of the electrical industry in a lighting exhibit at the Atlantic City convention of the National Electric Light Association, and a full-sized show window with a rather elaborate lighting layout attracted a great deal of attention. Color effects were obtained by the use of gelatin screens placed across the mouths of standard show window reflectors with Mazda C lamps. Theatrical spotlights of a simple type were also used with color screens for special effects.

This particular display indicated some of the possibilities. It consisted of an exhibit of wicker furniture, with the window arranged somewhat like a summer porch. The combination of lighting which gave the most pleasing results consisted of green general illumination, a low intensity of unmodified footlighting, portable table and floor lamps equipped with low-wattage lamps, and two overhead spotlights furnished with purple and orange screens respectively, directing beams of light at the base of the portable lamp. It was made quite evident that all window display should not be treated in the same manner, but that each picture created by the display man should receive special attention.

The equipment used at Atlantic City has been demonstrated in a number of other places since that time, and attracted much attention from local merchants and display men. It is rather interesting to note all over the country in the show windows of the leading stores a growing use of the effects demonstrated.

The display man from his training and temperament is naturally artistic, and once having

had the idea of colored lighting brought to him he makes use of its possibilities in a remarkably artistic manner. He recognizes that the show window's purpose is to attract attention and to create a distinct impression. The possibilities along this line are unlimited. A window was recently shown on one of the most prominent streets of New York City which might be described in brief as follows:

The solitary exhibit in a particular section of the window consisted of a gigantic peacock with tail outspread. The lighting of this was accomplished by a relatively low intensity of blue illumination from footlights, the regular lighting units not being used. Overhead at one corner of the window was located a standard incandescent stage spotlight so focused that it sent a circle of illumination approximately 2 ft. in diameter to the tail of the bird. The combination was particularly impressive and excited much admiration, although the laymen did not realize that the special lighting was the thing which made the exhibit impress itself on his mind.

In art, all pictures are not of the same color or same brightness and do not express the same mood. Neither should every show window in a store be equally bright or lighted in the same manner. If one glances down a group of windows in a large department store they should not all appear the same. Each display should be treated differently. For some exhibits a pinkish tint of light might be suitable; for others a deep amber; still others might require a light green, etc. The display man can readily determine just what effects he desires.

Every large store should have several sets of gelatin color screens which can be attached to the show-window reflectors and the lighting modified as displays are changed. For pure color,

Light-Colored Dull-Finish Background Is Particularly Well Suited to Display Windows; It Makes the Window Appear Bright with a Minimum Amount of Light and Prevents Reflections of Light Sources.

an entire section of the window can be equipped with the color screens, or if just a suggestion of color is wished, a few of the units can be equipped, leaving the others unmodified. It would be possible, for example, to have a display which required deep green lighting at one end, shading through amber to clear or unmodified lighting at the other end. This can be readily accomplished application to the show-window reflectors. In addition to these, the large store should have available some standard stage suspension type spotlight which can be plugged in at will and used to bring out particular objects to a high intensity. A small footlight type of spotlight has also been developed which is used with or without color screens and is another valuable medium in the hands of display men.

It is not necessary for the merchants to install a great deal of special wiring or multiplicity of circuits in windows to get the different effects, although to produce a colored light, of course, means considerable absorption, and hence a higher wattage is required for lighting any particular area. The pleasing effects secured, however, amply repay for this additional expenditure. If standard show window reflectors with 150-watt Mazda C lamps are placed as close together as construction will permit, there is usually sufficient wattage to obtain the desired effects.

The daylight Mazda lamp has become another valuable medium in the hands of the display manager. An installation of such lamps causes the window to be distinctive and the goods are shown in practically their daylight value. It is not expected that the daylight lamp will effectually supersede the Mazda C for all window lighting, yet there are certain displays which are shown to their best advantage under this kind of light. Under the light of the daylight lamp linens and white goods appear pure white rather than slightly yellowish; men's clothing, particularly if blue or black, shows up splendidly; furs, jewelry, shoes, neckties, and the like are well displayed. Along with the other colored lamps a set of these approximate daylight lamps for a couple of sections of the show window should be available, and when such displays as those mentioned are set up these lamps should be installed to obtain the best effect. With colored lighting it is possible to vary the equipment as occasion demands, avoiding monotony and obtaining the best advertising value.

Direction of Light.

On the stage there are many points at which lighting units can be located: overhead, below and at the sides. Space in the show window will not permit such latitude. In general, the most useful lights on the stage are those in the border and proscenium strips. They supply diffused light from overhead and in front. It is true that footlights are used a great deal on the stage, but these are employed more as a matter of necessity and are required when the actor is downstage or near the audience. He then gets beyond the range of the borderlights and would be in comparative darkness if it were not for the footlights. Some stage directors, recognizing the disadvantages of footlights, have eliminated them by building special aprons behind which overhead lights can be placed farther out toward the audience than normally.

The actor, knowing that he is to appear before the footlights, adjusts his make-up to offset the reversal of all facial shadows which results from the light coming from below rather than overhead. The lay figure, or model, in the show window is not decorated in this manner, so that by the proper selection of color screens and their

footlights are usually out of the question in window illumination. A very little light from below, however, is sometimes desirable to cut the shadows at the base of the figure and show the footwear to better advantage.

In general, the light must come from in front of the goods in order to avoid bad shadows. Shadows are necessary, but they should not be too sharply defined. We should have no difficulty in distinguishing objects in shadow, nor confuse the edge of the object with the edge of the shadow. The so-called shadowless windows are unsatisfactory, since the sense of size, proportion, distance and texture are either lost or so badly distorted as to repel observers rather than attract them.

Lighting units should be placed in the upper front part of the widow. In order to introduce the certain element of diffusion mentioned above, a number of small lamps are preferable to one large unit giving the same amount of light. There may be exceptions to this rule.

The object of a show window is to attract attention by a striking appearance. It is a well-known fact that very startling effects can be produced by varying the direction of light. These can be readily investigated with the assistance of a small shadow box. The display man spends hours arranging an artistic window. He should devote a part of that time to the adjustment of the lighting. All displays should not be lighted in the same manner. The display man should experiment a little. Some exhibits may require the predominating light coming from one direction, others from another angle. This can be done by varying the size of lamps used. For example, those at one end of the window may be 100-watt lamps, while those at the other end are, say, 25-watt. Great possibilities along this line present themselves.

Except under special conditions (where the display is practically on the floor of the window) lamps should never be placed in the middle of the show-window ceiling, for this arrangement causes the front of the goods displayed in the foreground to be in shadow. Another objection to lamps so placed is that they cannot be effectually concealed.

A lamp should never be placed directly outside of the window. Some persons think this necessary to attract attention, but the glare from a high candlepower light source for this purpose is very bad. A light outside the window causes the sidewalk to be brilliantly lighted, which is not the best condition, for a window should stand out by contrast. Lamps outside of a window do not light the goods effectively.

Trimming and Background.

Every merchant knows that proper window dressing is a very important factor in the standing of his store. The public is very prone to judge a store by its window display. As far as the lighting is concerned it is important to arrange the dress so that one article will not cast a shadow on another important display.

The window background should be arranged to suit the dress. It should be chosen to avoid specular reflection. A mirrored backing is particularly undesirable as it shows the reflection of the show windows on the opposite side of the street as well as the lighting units of the window itself. Many windows have glass above the paneled woodwork in the rear for the purpose of allowing daylight to enter the front portion of the store. To avoid reflections from this glass, shades that harmonize with the background should be provided to cover it at night.

Some of the windows of recent construction have a feature which is quite desirable from the lighting standpoint. They employ a light-colored background with mat or dull finish. The light color of the background makes the window appear especially prominent, while the dull surface prevents annoying reflections of the lamps. On the stage one very seldom sees a scene painted a dark, dingy brown or gray, which appears dull no matter how much light is supplied. If the show window is to appear bright, dark wood backgrounds should not be used.

Effect of Direction of Light on a Lay Figure.

Special Considerations.

There are two general types of windows, the open and the boxed-in. The open window is the type usually employed in the small store, and economies of lighting must be taken into careful consideration here. Many small stores depend on the light from the show window to assist in lighting the front part of the store, the window being back only a distance of two or three feet. For these windows the methods of lighting outlined may be applied, but often practical considerations demand that the window lighting equipment be more or less a continuation of the system used in the store proper. In this case, where direct lighting is used the lamps should be bowl-frosted, and the reflectors hung high to get them out of the ordinary field of view.

The higher grade stores have a dust proof, boxed-in window, and the methods which have been discussed apply particularly to these.

For very shallow windows, reflectors must be used which concentrate the light in a narrow angle straight downward. In a shallow window it is desirable to avoid much shelving and dress the window on the back and floor. This arrangement keeps shadows at a minimum. If shelves are essential, show-case lighting equipment of small size must be installed to get the correct lighting effects.

A very serious defect in large window lighting is found where lighting units are necessary along both edges of a corner or island window. If special precautions are not taken, practically all the lamps down the opposite side or edge are fully visible. A trough reflector is especially bad in this respect. Individual reflectors are some-

what better. There is a special type of prismatic unit with a shield to conceal the filament from view that is very useful in these instances. Another method that can be well applied is the use of shields or louvers between lighting units. These may consist of narrow metal or pasteboard strips placed perpendicular to the window and ceiling. In this manner but one or two lamps are visible at any particular location.

In the lighting of an island window, there are very exacting conditions to be met which are not found in windows that are viewed from only one direction. Due to the fact that the material on display is seen from all sides, it is necessary to so illuminate it that it will appear well, regardless of the angle from which it is viewed. Any light sources in the field of vision will detract from the display as they are a source of glare. Some island windows have been constructed in which the ceiling is dome-shaped rather than flat, and a cove provided on all four sides of the window at the lower edge of the dome. Around this cove are located Mazda C lamps in suitable mirrored reflectors so placed that the light is directed to the dome of flat white finish. With this arrangement no lamps or reflectors are visible and the method of illumination is, of course, totally indirect. In one very satisfactory installation, approximately 15 watts per sq. ft. of floor area was employed.

Present Practice in Show-Window Lighting Fixtures.

To obtain data on the present practice in show-window lighting investigations were made of the equipment in the high-class dry goods and department stores of 40 cities scattered throughout the United States. A total of 125 stores were inspected.

The reflecting equipment was as follows: One-piece mirrored-glass angle reflectors, 53; mirrored trough reflectors with lamps horizontal, 43; prismatic-glass angle reflectors, 16; aluminum-finish steel angle reflectors, 8; dense opal bowl-shaped glass reflectors, 5.

Figures were secured of the size of lamp and spacing of outlets; the grand average was 53 watts per running foot of window.

Show and Wall Cases.

The show case and the wall case are miniature show windows within the store, and the necessity for their correct lighting is the same as that for the exterior show window. They should be well illuminated to attract the attention of the shopper to the merchandise within; they should stand out in contrast to the surroundings, and therefore should be more brightly illuminated.

Good illumination renders sales work easy, for close selection can be made without removing goods from the case. The decreased handling also eliminates shop wear of the goods on display.

Show cases, where they are of the counter or wall type, must be lighted by lamps placed within the case and hidden from view. The glass of the case forms a reflecting device which gives images of lighting units placed outside which are almost as annoying as the light sources themselves. The lamp must be concealed from the customer, and special attention must be given to the protection of the clerk's eyes. The latter is in a fixed position with regard to the show case, and if bright spots are continually visible, fatigue, headache and eye-strain result.

The lighting unit must be quite small to give the least obstruction to a clear view of the display. The upper front edge of the show case is the logical location for the lamp and reflector. This gives the correct direction of light, as pointed out under show windows.

The lighting equipment must be neat and in harmony with the finish of the metal parts of the fixtures. The modern show case is often almost entirely of glass, and neatness is, therefore, most important.

The wall case usually has a cornice at the top behind which the lighting equipment can be concealed. Its requirements, therefore, are not as severe as for the show case, nevertheless it is desirable that wall case equipment be small and inconspicuous.

As low a wattage as possible must be used, for a show case quite frequently is air-tight. Circulation is at a minimum and any appreciable dissipation of heat will raise the temperature of the case to such a degree that the goods are likely to be affected. This is particularly true in confectionery and cigar stores. The Mazda lamp is especially effective in this regard as it gives off a relatively low ratio of heat to light.

The equipment must be constructed to eliminate fire hazard. Concealing the feed wires in small metal tubing is excellent practice.

A Show Case Display Brought to Attention of Customers by Tubular Bulb Mazda Lamps in Small Concealed Cylindrical Reflectors.

Shoe Display Under a Properly Designed Lighting System; There Are No Lamps or Reflectors Visible and No Reflections to Annoy.

The general considerations of intensity of light are the same as those indicated under the show window, light goods requiring less illumination than dark displays. A good average figure toward which to work is from 15 to 20 foot-candles.

Reflectors should be used to confine all the light to the show case and distribute it evenly over the trim. Needless to say, these should be of high reflective power to get the maximum light with the minimum energy expenditures.

Individual small mirrored-glass reflectors are available for use with the 15-watt, round-bulb, candelabra-type lamp, and cylindrical trough reflectors for use with the 25- and 40-watt long, tubular lamps.

The show case, with its average dimensions of 30 in. high and 24 in. deep, requires a reflector which emits its maximum light at about 45 deg. from the vertical. The wall case is usually high and shallow, approximately 72 by 30 in. This requires reflectors giving more concentrated distribution of light, with the maximum about 20 deg. from the vertical.

Layout for a Demonstration Window.

The central station or electric shop should naturally be in the lead in any particular community with regard to lighting matters. If its show windows are equipped in such a manner that the effect of colored light can be demonstrated, they will no doubt awaken much interest on the part of the merchant in this subject. A number of prominent electrical dealers throughout the country have already established this practice.

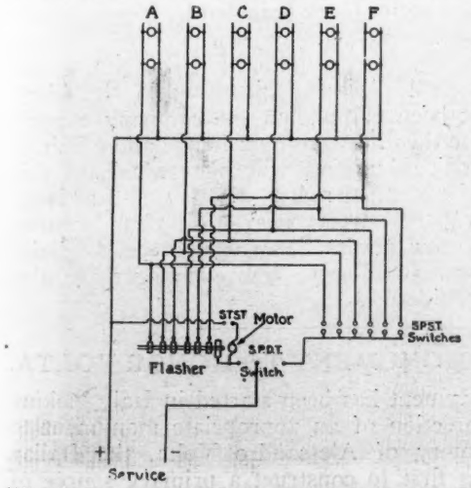
By means of a flasher, the lighting effects are demonstrated in the electric shop and it forms an excellent means of attracting attention. It is not a good practice, however, in the average store to have a complicated wiring system or this variation by means of a flasher, for it is not the ultimate artistic end of window lighting.

In view of the interest on the part of the electrical fraternity in this subject, the following appendix gives some suggestions as to layout of windows for demonstrating the effects indicated under color lighting:

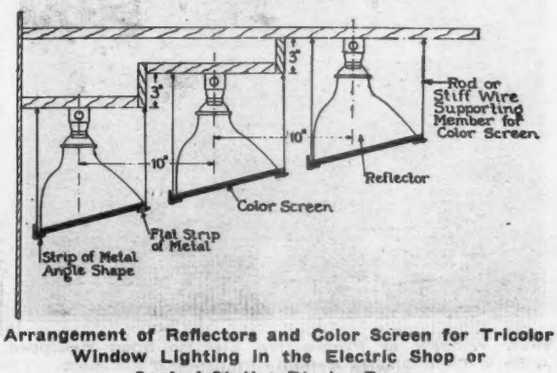
The overhead standard window lighting reflectors should, in general, be arranged in three circuits which are called for purposes of convenience, "A," "B" and "C." To get a suitable number of lamps, it is necessary to have three rows in the average window. Reflectors should be placed as closely together as possible, *i. e.*, on 1-ft. centers and arranged in steps. This is necessary to avoid one reflector interfering with light from the lamp in front of it.

Three outlets can be installed for each front foot of window; thus a 10-ft. window would have 30 outlets. These should be divided approximately as follows: Circuit "A," 15; circuit "B," 9; circuit "C," 6; for other dimensions similar proportions apply. This combination gives the possibility of low, medium and high intensity.

When color screens are applied, the densest should be placed on circuit "A" and the lightest on circuit "C." For example, with the three



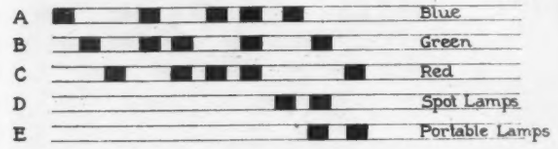
Wiring Diagram for Manual and Automatic Control of Tricolor Window Lighting.



Arrangement of Reflectors and Color Screen for Tricolor Window Lighting in the Electric Shop or Central-Station Display Room.

primary colors, blue, green and red, circuit "A" should be blue, circuit "B" green and circuit "C" red. Lamps of 150-watt capacity should be used. This may seem an abnormally high wattage consumption but it is necessary on account of the absorption of the color screens.

Color Screens and Holder.—A standard theatrical color slide consists of two sheets of tin



Suggested Sector Layout for Flasher.

with a circular hole. Gelatin screens are slipped between these two metal plates. For placing the color screens in proximity to the mouth of the reflectors, a suggested arrangement is as follows: A strip of metal, bent into an angle shape, is stretched the entire length of the window, approximately opposite the lower edge of each row of reflectors. A similar flat strip of metal is carried the length of the window opposite the upper edge of the mouths of the reflectors. These can be fastened to the ceiling by rods, stiff wire or any other feasible scheme. The color screens are then laid across these two metal strips, the angle portion holding them in place.

Spotlights.—The effect of a concentrated beam of definite shape of rather high intensity is novel in the show window and has a distinct value. An inexpensive suspension type spotlight is on the market. This consists of a cylindrical housing socket, focusing device and lens for obtaining the spot, a 500-watt round bulb concentrated filament Mazda C lamp being used. Color screens are placed across the lens opening and changed as occasion requires. The spot lamps should be on a separate circuit. For a small window one spotlight will be satisfactory and for a larger window it might be well to have two.

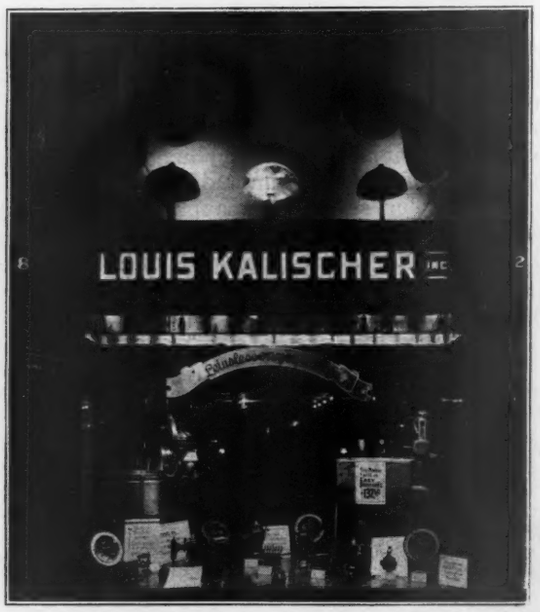
Receptacle Circuit.—A few portable lamps are occasionally desired in the window and a fifth circuit, called "E," should supply the baseboard receptacles serving these units.

Flasher.—A low-speed adjustable sector flasher is necessary. Five circuits are required for the proposed layout and these should be of 1100-watt capacity.

Wiring.—The general scheme of wiring is shown in the accompanying illustration. From the service one side leads direct to all lamps with a tap for the flasher motor. The other side of the line is led to a single-pole double-throw switch. One branch of this feeds the series of single-pole, single-throw, flush wall switches for manual control of the window-lighting circuits. The other branch feeds these same circuits through the flasher with a tap for the motor. It is also necessary to have an auxiliary switch on the motor circuit, otherwise with the wiring arrangement shown the motor would be in operation when any of the individual circuits are thrown on manually, although the flasher control would not be affected.

Layout of Sectors.—This, of course, is susceptible to a great many changes and is most flexible. With the arrangement shown the following combinations will be obtained: Blue overhead; green overhead; red overhead; blue and green mixed overhead; red and green overhead; red and blue mixed overhead; red, green and blue overhead; blue overhead and spot lamp; green overhead, spot lamps and portable lamps; red overhead, spot lamps and portable lamps.

General.—It is not necessary to confine the color effect to the primary colors; amber, purple and the like are also very effective. If it is desired to use the window without color effect, the screens can be omitted from circuit "B," for example, and this circuit left on permanently. This will provide a high intensity of unmodified window lighting of an excellent character.



Show Window of Progressive Electric Shop Equipped with Tricolor Lighting.

NEW YORK TELEPHONE CO. OBTAINS NEW SITES IN MANHATTAN.

In furtherance of a construction program looking toward a rehabilitation of service the New York Telephone Co. is conducting a real estate buying campaign in Greater New York. The company already has virtually obtained possession of the entire block bounded by Vesey, West, Washington and Barclay streets in the downtown section of Manhattan. Negotiations for several small pieces of property in the block have not been closed, but the company expects to acquire them. A large exchange and administrative office building will be erected on this site. The company has also bought a large plot on 73rd street, near Columbus avenue, where a new automatic exchange will be built. Sites for several more new exchanges are also being considered.

PLAN MONUMENT TO HONOR VOLTA.

A movement has been started in Italy looking to the erection of an appropriate monument to the memory of Alessandro Volta, the Italian who was first to construct a primary source of direct current, the Voltaic pile.

Lighting of the Living Room

Advantages and Disadvantages of Different Types of Fixtures, with Summary of General Principles of Illumination as Applied to the Living Room—Third of a Series of Articles on Residential Lighting

By M. LUCKIESH
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Some one has stated that the home is the theater of life and this association leads to a comparison of residence lighting with stage lighting. The real aim of light on the stage is to aid in providing an appropriate setting or to enhance the mood or occasion. The home is a place of various moods and occasions, and the lighting can be made sufficiently flexible to be adapted to the various activities, moods and occasions. This point will be emphasized in the discussions of the lighting for various rooms, but this article will be confined to the living room.

To provide only the monotonous lighting which is the result of a single ceiling fixture and generally inadequate equipment is to limit the possibilities of lighting and to insure dissatisfaction. It should be the aim in designing the wiring and in selecting the fixtures to obtain a variety of lighting effects, in order that lighting may do its share toward providing the proper environment for various moods and occasions. In fact, after a house is decorated and furnished, lighting is the only factor having sufficient mobility to provide extensive variety. Herein lies the opportunities of lighting.

Disadvantages of the Central Ceiling Fixture.

Most living rooms contain a central fixture suspended from the ceiling. Such a means for lighting this type of room may be shown to possess serious disadvantages. In the first place, a ceiling fixture in the center of the room is generally in the field of view when persons are engaged in conversation in the living rooms of small and medium size. It is almost impossible to avoid glare and consequent discomfort. Even though the lamps are well shaded there is usually a noticeable glare. In fact, the bright ceiling due to a totally indirect lighting system is annoying when it must be endured for a long time. Another disadvantage of such lighting is the inartistic symmetry of the lighting effect. A simple experiment comparing a symmetrical with an asymmetrical distribution of light emphasizes the general desirability of the latter where artistic effects and the expressiveness of the room are appreciated.

In the small living rooms the central ceiling fixture may be a necessary compromise, owing to limited space, but there is a tendency toward larger living rooms. In the larger rooms the ceiling fixture is usually an obtrusive object and it certainly reduces the extensity of the room. It interferes with the effectiveness of delightful proportions and in general it appears to be undesirable. Fortunately, as living rooms increase in size, the difficulties in lighting diminish.

Advantages of Portable Lamps.

Portable lamps afford the most generally effective means for lighting this type of room. They are mobile; as many may be lighted as necessary; the number of lighting effects obtainable increase with the number of lamps and circuits; and the lamps may be at all times decorative furnishings. An adequate supply of baseboard receptacles makes it easy for the housewife to rearrange the furniture without being restrained by lighting considerations. This is always a desirable feature, but the present supply of receptacles is grossly inadequate. A small living room should have at least four baseboard

Fig. 1.—Suggesting the Restful Mood Obtained by Localized Lighting Obtained by Means of the Direct Component of a Portable Lamp.

Fig. 2.—By Means of a Switch and the Indirect Component from the Same Lamp, the Mood of the Room May Be Changed to the Other Extreme.

outlets and a room 14 ft. by 24 ft. should have at least six. As one looks at the lighted portable lamps he may feel that these are the "home fires" of the present age.

With an adequate supply of portable lamps the householder will be able to obtain a range of lighting effects and the various occupants of the room will be likely to find a comfortable place for reading. However, in purchasing a decorative portable lamp it is well to sit in a chair near it, if it is a floor lamp, or close to the table upon which it rests, if it is a table lamp. In this manner its effectiveness is easily tested and certain minor defects, such as relative dimensions, height, width of shade, shape of shade and position of the light sources, may be noted. Apparently insignificant details make a portable lamp satisfactory or unsatisfactory. Of course, some of the smaller portables are merely ornamental, but the larger ones may just as well be useful as decorative.

Incandescent lamps used in decorative portables or other lighting fixtures produce the best results generally if they are frosted or otherwise diffusing. The shades should be satisfactory when the lamp is lighted as well as when unlighted. Ofttimes silk shades, for example, may be beautiful when unlighted, but by transmitted light they may not be dense enough or their color may not be the best. The table lamps may vary widely in dimensions, but the floor lamps may be classified into three types according to height. The tallest is the type which provides both a direct and an indirect component of light. The shortest floor lamp may be a portable reading lamp which may be drawn close to a chair. If the light source is about 50 ins. above the floor and the shade is fairly shallow and closed at the top, this provides an excellent portable reading lamp which is really a miniature floor lamp. Such a portable is difficult to find in the fixture store, but it is much more satisfactory in the living room than the less decorative type of portable reading floor lamp. Another height between the shortest and tallest floor lamp is satisfactory; it is one from which only a direct component is obtained. The portable lamp is very desirable for lighting a desk or a piano. In fact, portables may supply all the lighting requirements in a living room.

There are occasions when general lighting is desired, but to live for hours each evening under a flood of light cannot be enjoyable. Such lighting eliminates all the pleasure of subdued and localized lighting so desirable for reading and resting. On eliminating the ceiling fixture other means should be provided for obtaining a flood of light when desired. This can be obtained effectively from portable lamps, if an indirect component is provided. Several types of these units have been available for years but they have not received the attention which they deserve. How long will it be before fixture designers will realize that as much apparatus can be stowed away beneath the shade of a portable lamp as can be placed in an unobtrusive ceiling fixture?

Fig. 3.—A Unit Which Has Decorative Possibilities in the Home; Localized Lighting May Be Obtained by Means of Portables.

Fig. 4.—In a Combination of Ceiling Fixtures and Portables the Former May Be Used for Obtaining the Moderate Intensity of General Illumination When Occasions Demand It.

Owing to their positions, wall brackets are sources of discomfort if they are not heavily shaded. They are nearly always in the field of vision when several persons are engaged in conversation in the living room. If they are depended upon for general lighting, the bright walls and ceiling are often annoying. If they are located properly and are equipped with pendent shades they may serve as reading lamps, but being fastened to the wall they do not possess the advantage of mobility which is possessed by portable lamps. Their positions may be predetermined in a manner similar to baseboard outlets, namely, by relating them to the important arrangements of the furniture. The wiring of a new house should not be laid out without first carefully considering the arrangement of the important articles of furniture. Incidentally, this also provides valuable information for the placing of windows. But to return to wall brackets, they may serve purely utilitarian purposes but their chief right to exist in the living room is as vital sparks of ornament. This is a sufficient reason for the existence of any fixture which is intended only to be decorative. A beautiful bracket equipped with a dense shade containing a small lamp is as ornamental as any piece of bric-a-brac can be. Incidentally, small lamps and as large shades as are compatible with artistic appearance conspire to reduce the brightness of wall brackets within proper limits for comfort.

In a later article the wiring plans of a middle-class residence will be presented as a summary to the preceding discussions, so the outlets need not be further discussed at present. It should be noted that in general there are two extreme functions of the living room. In one case there should be a sufficient intensity of general illumination that the faces of the occupants can be readily distinguished during conversation. The decorative portables may also operate, thereby furnishing interesting variety. The other extreme occasion is one of restfulness. Localized lighting with a small amount of general illumination affords a restful environment which is most desired for reading or for contemplation. Between these two extremes is to be found a variety of occasions whose lighting requirements are met by adequate portables.

Use of Color in Living-Room Lighting.

In the living room and, in fact, in most rooms the illuminants of warm tints, such as the candle flame, are generally desired by those who are sensitive to the esthetic features of their environment. Many persons are still using the carbon-filament lamps owing to their warm color. This warm tone may be obtained to some extent by means of tinted shades, but it is

more easily obtained by a tinted lamp. However, the mistake is often made of using amber instead of warm yellow. Experiments with incandescent lamps tinted to match the color of the candle flame emphasize the charm of tinted light in the home. Color is demanded in every other aspect of the home where artistic considerations are present and it is bound to become more and more utilized in lighting. In fact, its possibilities in lighting are very extensive and in some respects outrank color in decoration and furnishing. The day is approaching when the lighting artist will in every sense "paint with light."

Photographs and half-tones are unsatisfactory for representing lighting effects, but they aid in emphasizing ideas. In Fig. 1 a living room is shown lighted by the direct component of a portable lamp. The effect is restful and one's thoughts may be concentrated. Some general lighting results from the scattered light. The mood of the room is very definite and opposed to that of Fig. 2 in which the same room is shown with the indirect component of the lamp in operation. Such a unit may be made very easily by providing an inverted reflector above the usual sockets. The shade in general must be deeper than is otherwise required. However, it is not difficult to make such a portable with a small opal shade inverted to provide the upper component from a 75-watt Mazda C lamp.

The shower and ceiling bowl are fairly satisfactory, if the glassware is dense, but lamps of warm tints appear to add a restfulness. Textiles for the shades or ceiling bowl prove very satisfactory.

In Fig. 3 is shown a recent development which provides an indirect component and a direct component simultaneously. This is limited to the one lighting effect, but it is satisfactory for those occasions when general lighting is required if a ceiling fixture is desired. This unit has the advantage of being readily equipped with a silk shade which makes it possible to vary its appearance to suit the taste. For very small living rooms it embodies an excellent compromise of various factors when only one unit is to be used. However, in general, portable lamps provide lighting for those occasions when restfulness is the dominant desire.

In Fig. 4 is shown a living room in which the ceiling fixtures may be best used for supplying general illumination for the accasions which demand it. The room, however, would be more pleasing in appearance without these fixtures.

Summary of General Principles of Effective Living Room Lighting.

It is dangerous to present specific rules in a field of lighting where taste is such a dominant factor, but it is safe to indicate underlying principles which are not subservient to taste. These underlying principles are based upon the psychology of light and color, upon the practical considerations, and upon the desirability of variety in lighting effects.

The living room should be adequately supplied with outlets for portable lamps and wall brackets. Perhaps the ceiling outlets should be provided as insurance against future developments.

Ceiling fixtures are not generally as satisfactory in living rooms as portable lamps. A disadvantage of the ceiling fixture is that occupants of the room are required to face it quite frequently.

Reading can be done most comfortably near a satisfactory portable.

Brackets are chiefly of decorative value and they should be equipped with dense shades and small lamps.

Portable lamps represent the most mobile lighting system available for the living room. When general lighting is not provided for by any other fixture, a portable should be available which provides an indirect component. In the case of a large room, more than one of these lamps may be necessary to supply adequate general lighting for those occasions which make a demand for it.

At least four baseboard outlets should be provided for living rooms of small and medium size. In the larger living rooms of the middle-class home six and even eight will be found desirable if the potentiality of lighting is to be adequately utilized. The cost of these outlets compared with the cost of the house and with the satisfaction obtainable from lighting is insignificant. The householder will pay for them if he has the lighting possibilities properly presented to him.

The first article of this series appeared in the issue of March 13 and gave a constructive analysis of various aspects of residential lighting, outlining the possibilities in this field. The second article, which appeared March 27, took up the subject of lighting effects versus lighting fixtures. The next article will deal with the lighting of the dining room and will be published in an early issue.

THREE ELECTRICAL SHOWS LISTED FOR SUMMER AND FALL.

Plans are already under way for at least three electrical shows during the summer and fall months, while one is in progress this week at Ardmore, Okla., where the Consumers Light & Power Co. is staging a big exhibition. Montpelier, Vt., will hold a show in June, and Worcester, Mass., has plans prepared for one in September to be held in Mechanics' Hall, through the co-operation of the Worcester Electric Light Co. and the jobbers and contractor-dealers of the city. Indiana and Kentucky jobbers and contractor-dealers have combined for the purpose of holding an electrical exhibit at Louisville, Ky., Oct. 25-30.

LIGHTING COMPANIES OF LONDON INCREASE DIVIDENDS.

It is gratifying to note, says the *Electrical Times* of London, England, that, in spite of coal controllers, lighting restrictions and other burdens, the London companies have been able to declare dividends for 1919 at a higher rate than for 1918. The City of London Co. heads the list with a 10% dividend and a 3% bonus; at the other end is the London Electric Supply, which declared a 2½% dividend, the first since 1914.

Step Induction Regulator for Electric Furnaces

Description and Operating Features of New Control Equipment for Electric Furnaces—Paper Before American Electrochemical Society

By P. B. SHORT

General Engineer, Westinghouse Electric & Manufacturing Co.

The present type of arc furnace used for the melting and refining of steel is for the most part a furnace requiring not more than one or two operating voltages. In the smaller-sized arc furnaces one operating voltage is generally sufficient, whereas in the larger sizes two operating voltages are often desirable. The higher operating voltage is used for the melting of the cold charge and the lower voltage is employed during the refining stage. When an arc furnace is operating on a constant voltage the power input can be varied by moving the electrodes and thus lengthening or shortening the arc.

In contrast to the arc furnace there is the resistance furnace, and the furnace of the submerged-arc type, where the electrodes are stationary. In these furnaces the load is largely a straight resistance load, the charge itself often making up the resistor. In this case a varying voltage is desirable, for the resistance of the load will change as the temperature rises, and means are required for controlling the input of power into the furnace. Resistance furnaces and furnaces requiring a variable voltage supply are rapidly increasing in number, and are now in use for graphite, brass, zinc, carbon-bisulphide, heat-treating and numerous other uses of similar character.

One of the most satisfactory means for supplying power to a furnace of the resistance type has been found to be the use of a combination step induction regulator. This consists, in the main, of a furnace transformer with taps in the primary winding, and an induction regulator for bridging between the voltages given by the transformer taps. With this combination, a continuous voltage, without breaks, can be secured over a wide voltage range.

A complete unit for this service consists of a furnace transformer, an induction regulator, a selector switch, a transfer switch, a series transformer, and a panel containing the necessary meters and control for the equipment. A 1100-kv-a. equipment of this type is shown in Fig. 1 and Fig. 4. These illustrations show one of twenty equipments that were recently manufactured for service on zinc furnaces, to be installed in Norway.

The transformer part of the unit has a low-voltage winding similar to that on any furnace transformer. The leads consist of heavy copper bars coming straight up from the winding, as illustrated in Fig. 2. The leads are interlaced so that the reactance is kept to a minimum. Where a wide voltage range is desired, the low-voltage winding is made in two sections, so that it may be placed in parallel for securing the lower part of the voltage range. The high-voltage winding is divided into three sections, as shown in Fig. 3. One section forms the main winding, which is not changed throughout the voltage range. A second section (winding *A*) is not metallically connected to the primary circuit, and this is used for exciting the induction regulator. The third section is divided into many parts, and taps are brought out from each part for connecting to the selector switch. By this means, various parts of the third winding may be cut out or in by the operation of the selector switch *S*, as it is desired to raise or lower the furnace voltage. The taps coming from the high-voltage winding are shown in Fig. 2, coming to the terminal board within the transformer tank. From this point they are brought through bushings on the tank and connected to the selector switch.

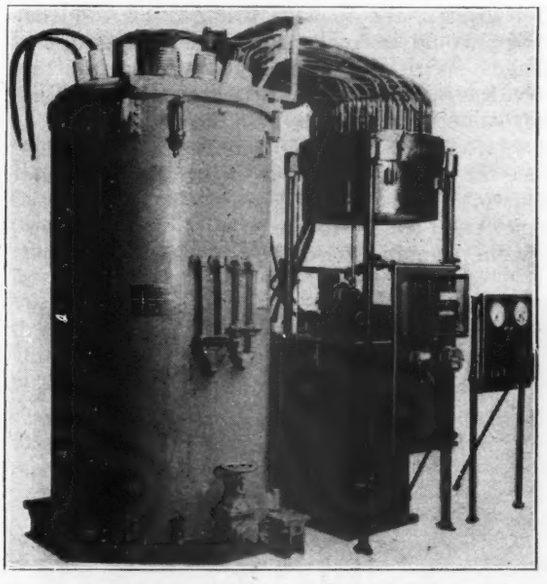


Fig. 1.—Front View of 1100-Kv-a. Step Induction Furnace Regulator Equipment.

The induction regulator is shown in Fig. 1 to the right of the transformer. It is immersed in oil and mounted in a corrugated iron tank. Above the regulator, on a pipe-frame mounting, are placed the selector and transfer switches. These are also immersed in oil. These switches are geared to the motor operating the induction regulator. The oil container in which the switches are mounted is counterweighed, so that the inspection of the switch contacts can be very

readily made. The control panel and instruments for the equipment are also shown in Fig. 1.

The operation of the step induction regulator can best be understood by referring to Fig. 3. The buck or boost of the induction regulator is equal to one-half the voltage secured between adjacent transformer taps. From Fig. 3 it can be seen that the primary circuit is completed through the first section of the high-voltage winding, through the transfer switch *T*, through one coil of the series transformer *SR*, and through the selector switch to tap No. 1 of the transformer. The series transformer merely insulates the induction regulator *R* from the incoming high-line voltage, and the action is the same as though the secondary of the regulator were connected directly in the line. Any voltage induced in the secondary of the regulator is carried directly through to the line by the series transformer. The induction regulator, therefore, adds to or subtracts from the normal line voltage in the same manner as though the series transformer were not used. When the induction regulator is in the neutral position, no voltage is added to or subtracted from the incoming supply voltage.

When it is desired to vary the furnace voltage, it is merely necessary to start the operating motor *M* of the regulator, and immediately a voltage is induced in the secondary of the regulator. In order to raise the furnace voltage, this induced voltage would be such as to add to the supply voltage. With the regulator continuing to revolve, the induced voltage would reach its maximum value, which is one-half the value obtained between adjacent transformer taps. At this point, the selector switch *S*, being geared to the regulator, acts so as to connect the next transformer tap (No. 2) to the supply. At this same point the transfer switch *T*, which is also geared to the regulator, acts so that the induced voltage in the regulator subtracts from, rather than adds to, the supply voltage. This last operation is secured by having the secondary of the series

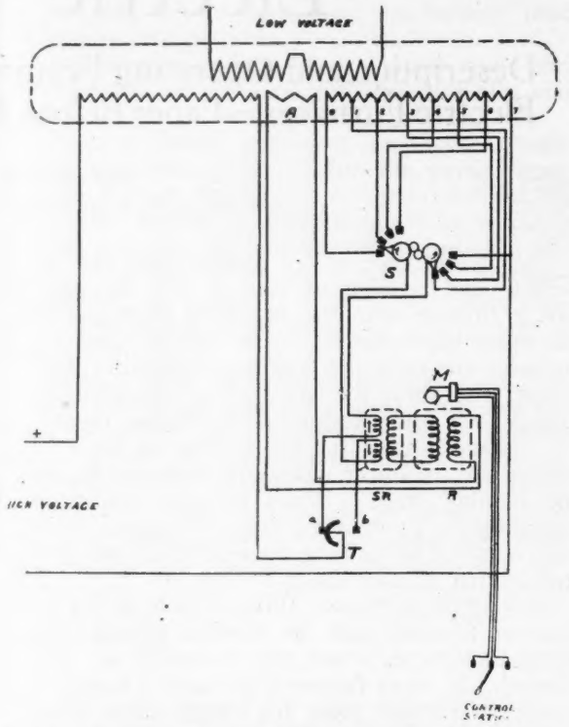


Fig. 3.—Circuit Connections for Step Induction Regulator for Electric Furnaces.

transformer made up of two windings, so that the reversal from boost to buck can be made through the transfer switch by reversing one of these windings, This feature allows the induction regulator to be rotated continuously in one direction, for either raising or lowering the furnace voltage. As the regulator continues to rotate, it again arrives in its neutral position, and at this point the supply voltage is applied directly to tap No. 2. This same operation is repeated in transferring from tap to tap until the entire voltage range available is secured.

For lowering the furnace voltage it is merely necessary to reverse the direction of rotation of the regulator motor, and the operation is otherwise the same as described in going from tap to tap. From this, it can be seen that the function of the induction regulator is in bridging between the voltages secured from the various transformer taps. The selector switch serves as a means for connecting the various taps to the incoming supply line. The transfer switch permits the regulator to be rotated in one direction for either raising or lowering the voltage. The series transformer is used to insulate the induction regulator from the high-line voltage. Where the supply voltage is comparatively low, this transformer is not used. In this case the general operation is the same, except that the induction regulator has two secondary windings taking the place of the two windings provided on the secondary of the series transformer.

With this equipment, any voltage within the range can be secured at the furnace by the simple operation of the control handle mounted on the

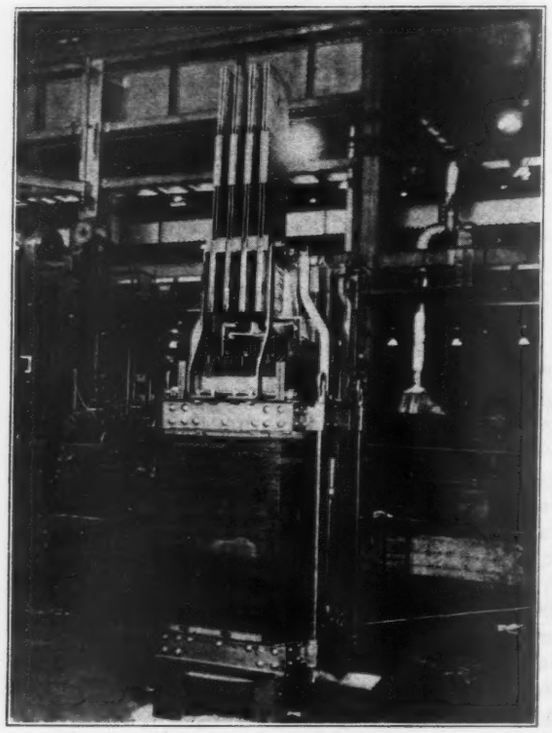


Fig. 2.—View of 1100-Kv-a. Transformer for Electric Furnace—Casing Removed.

switchboard panel. The apparatus may also be controlled entirely automatically by a constant-current regulator. This can be arranged so as to maintain either constant current or constant energy within the furnace. The automatic control is shown mounted on the panel in Fig. 1.

Efficiency and Power-Factor Not Affected by the Control.

The capacity of the induction regulator is small as compared to the capacity of the main transformer, for the regulator is used merely in bridging between adjacent transformer taps. Because of this, the efficiency and power-factor of the equipment are not appreciably affected by the control. The entire equipment is designed to withstand the stresses of the severe load fluctuations which are encountered in furnace service, and no external reactance is required for the protection of the apparatus. Load current is never broken by the selector or transfer switches, so that there is always energy input to the furnace, even while a change in voltage is being made. There is practically no arcing on the switch contacts, for the current that the switches are required to break is only the small circulating current that may flow during the transfer.

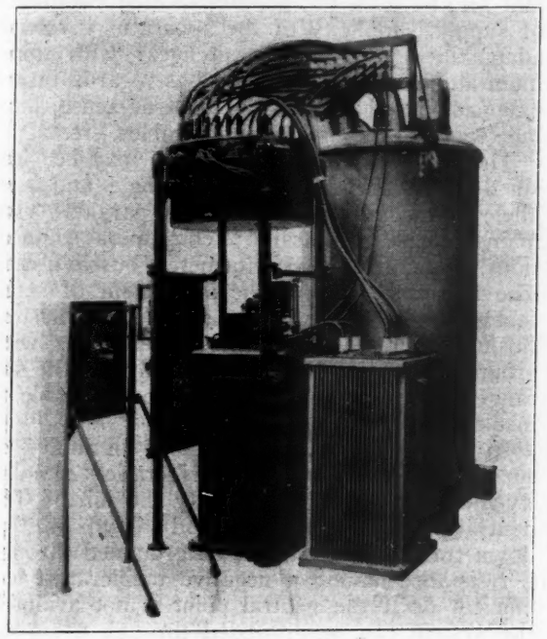


Fig. 4.—Rear View of 1100-Kv-a. Step Induction Furnace Regulator Equipment.

The equipment described represents the most recent development resulting from extensive experience in supplying electrical equipment for the electric furnace industries. The control of energy input to an electric furnace has become a matter for special consideration since the coming of furnaces in which are concentrated large amounts of power. The closest control of furnace voltage and energy input to the furnace is important from an economic standpoint, since the product becomes more uniform and the process more efficient when operating on the proper voltage. To the manufacturer, the former represents a higher price for his product, and the latter a lower manufacturing cost.

RESULTS OF RESEARCH ON THEORY OF CORONA PHENOMENA.

When high-potential differences exist between conductors the insulating property of the surrounding gas partially breaks down and a conduction of electricity through the gas takes place, usually accompanied by a glow at either one of the conductors or in the intervening space. This glow is called corona. The phenomenon is commonly seen when static machines or Tesla coils are operated in the dark and less frequently from the tips of lightning rods during an electric storm. Corona is evident at night, as it surrounds high-voltage a-c. transmission lines. The conduction represents a loss of power, which on long lines may become an important item. In 1912 F. W. Peek, by a stroboscopic method, showed that there is a difference between the corona discharge from positive and negative conductors. This difference indicates that corona caused by alternating potentials is a combination of two effects, and in order to study these effects separately and thus to learn the true facts concerning the phenomenon continuous potentials must be used. A study of the corona caused by continuous potentials may produce engineering data of value, owing to the increasing development of high-tension d-c. generation and transmission. Previous to 1914, Watson and Schaffers were the only men who had experimented on the d-c. corona.

Because of the desirability of a greater knowledge of the d-c. corona, the physics and electrical engineering departments of the University of Illinois determined to carry out detailed research to develop a satisfactory theory for the corona phenomena. The results of the experimental research which has been completed during the last few years have been published by Farle H. Warner and Jakob Kunz as Bulletin No 114 of the Engineering Experiment Station of the University of Illinois, Urbana, Ill. Copies of this bulletin may be obtained without charge.

DEMONSTRATION OF ELECTRIC ARC WELDING IS SUCCESSFUL.

The merit of electric arc welding in structural steel construction was recently demonstrated by the Electric Welding Co. of America in heavily loading a truss that had been constructed by its process. A load of 48 tons was successfully carried by a simple fan roof truss designed to carry only 45 pounds to the sq. ft. on a 40-ft. span. The steel was received, cut to length, held together by thumb screws, and electrically welded.

Bearing plates on the base of columns and brackets for carrying the rail for a traveling crane have been fastened together entirely by welding.

Seams have shown under actual test 90% efficiency, compared with 60% in the case of riveted seams, and over 100% in the case of lap joints where material outside the area of the weld has given way without effect on the welded section. In testing strength of an I-beam welded to other structural members, the flange of the beam has buckled with the weld remaining unaffected.

ELECTRIC MOTOR SUPERIOR TO GAS ENGINE FOR PUMP DRIVE.

Small Motor-Driven Pump Shown to Be More Economical and Flexible Than Gas-Engine Driven Pump.

An interesting practical comparison of the relative merits of electric motors and gas engines as driving units for small pumping installations is to be found in the waterworks at Milltown, N. J. Each type of drive is applied in this plant to similar pumps of a capacity of 350 g.p.m.

The equipment consists of two Deane triplex 10 by 10-in. plunger pumps, one driven by a Wagner 30-hp. two-phase motor and the other by an Ingego 30-hp. one-cylinder, four-cycle gas engine. The motor-driven pump uses in the average 17.5 kw. per hour, and the gas engine uses 550 cu. ft. of gas per hour. At the prevailing rates of $0.025 per kw-hr., and $1.15 per 1000 cu. ft. of gas the hourly costs are $0.44 for the motor and $0.63 for the engine.

The motor-driven pump is automatic in operation, starting and stopping as the water in a standpipe falls or rises to predetermined elevations. The motor will start upon the opening of a fire hydrant any place on the system. Only about one hour's time a day is required to clean and care for this set.

The gas engine is provided with an air compressor and storage tank for starting, but requires an attendant to perform the various duties incident to its operation. The daily pumpage of 84,000 gals. together with the incidental cleaning requires attendance of at least 5 hours, or five times as much as the electric pump.

The gas-engine pump was installed originally as an emergency unit and is operated at intervals to make assurance of its good condition. Both pumps may be operated in case of fire and by shutting the standpipe valve a pressure of 100 lbs. is available directly on the water mains.

The motor-driven pump has been in service for five years and has delivered 73,000,000 gals. of water without any breakage or repair costs.

THE PROTECTION OF ALTERNATING-CURRENT SYSTEMS.

Major Edgecombe Discusses Ideals and Shows How It Can be Obtained Without Recourse to Special Conductors.

The protection of a-c. systems without the use of special conductors was brought before the Institute of Electrical Engineers in London, Eng., recently by Maj. Kenelm Edgecombe, R. E. He endeavored to show how certain specified ideals could be obtained by simple means and with well-tried apparatus without recourse to special conductors, which however desirable in themselves were quite often out of the question.

The disconnection of faulty plant or feeders while at the same time maintaining continuity of supply, was, said Major Edgecombe, at the moment one of the most pressing of the problems confronting the power-station engineer and was becoming one of ever-increasing difficulty as networks were extended, larger power units were installed, and adjoining systems were linked up. Under present conditions, moreover, almost every network consists of a collection of cables laid at various dates, so that no system of protection which involves duplicate cores, pilot leads, conducting sheaths, or the like, can be regarded as a general solution of the problem. The methods adopted must be such as can readily be applied to the various sections of an existing system as well as to any future extensions.

The four cardinal points of a protective system are, he said, the maintenance of continuity of supply, simplicity of the apparatus involved, adaptability to existing switchgear with minimum alterations and flexibility as regards future extensions, and economy in its true sense, having regard to the investment in cables, etc.

The components of any system may be classified as independent feeders, single and parallel; interconnectors, single or parallel; ring mains, single or parallel; consumers' connections, generators, transformers, busbars, etc. The first step towards the attainment of satisfactory protection was to ground the system through a resistance. The paper dealt with grounded systems alone, but many of the arrangements recommended are also applicable to insulated systems.

In any scheme of protection, continuity of supply should be the first consideration, simplicity the second, and adaptability the third. The neutral points of generators and step-up or step-down transformers should be grounded through a resistance having a negative temperature coefficient or if the neutral point is not available the system can be grounded through a zig-zag transformer and a grounded resistance. In a large number of cases special conductors are out of the question, and any and every part of a distribution system can be protected by overload, reverse or leakage relays.

ELECTROLYTIC IRON IS PRACTICAL SUCCESS IN FRANCE.

High-Grade Iron Is Made in Tubes and Plates by Electrolytic Process Followed by Annealing.

Interesting recent developments in the production of electrolytic iron have been presented by Jean Escard in recent issues of *Le Genie Civil.* The method described involves the rotation of the cathode in a neutral solution of iron salts. The solution is maintained neutral by constant circulation over and through iron turnings. Liberation of hydrogen at the cathode is reduced to a harmless limit by the introduction, at a definite rate, of oxide of iron as a depolarizer.

By these methods it is possible to work with current densities as high as 100 amperes per sq. ft., and produce iron of excellent quality. The metal so produced compares favorably with the Swedish irons renowned for their purity. Two French companies are producing plates and tubes in a variety of shapes and weights by these methods.

Practical results have shown that for industrial work it is necessary to use strong current

densities. The electrolyte is generally chloride or sulphate of iron or a mixture of salts of iron. In using an electrolyte without special treatment the metallic deposit is very irregular and without commercial value. In order to obtain a smooth, compact, homogeneous deposit capable of being used after simple annealing, the electrolyte must be agitated, for instance, by the simple rotation of the anode, in such a way as to bring about an oxidizing action of the air at the same time as the real electrolysis. The iron salts, being easily oxidized, bring about a modification in the bath. Notably oxy-chloride of iron is formed, which reacts with the globules of hydrogen, deposited on the cathode, that cause bad deposits. The bath is satisfactory when it is chestnut in color and does not foam.

In order to obtain good results, the cathode must be rotated at a tangential speed which varies with the current density. The temperature must be regulated according to the current density and maintained absolutely constant. The concentration must be regulated according to the depolarizing power of the liquid and maintained absolutely constant. The speed of circulation of the electrolyte in front of the anode must be as high as possible.

It has been found that the phosphorus in the metal is decreased as the circulation of the bath is increased. If the neutrality of the bath is not maintained the deposit of metal cannot be commercially used, due to exfoliation. This neutrality can be realized by holding finely divided iron in suspension in the liquid or by bringing the electrolyte in intimate and constant contact with turnings.

The remarkable purity of iron produced by this electrolytic method is shown by analysis of which gives the following percentages: Iron, 99.967; carbon, 0.008; manganese, 0.009; phosphorus, 0.002; sulphur, trace, and silicon, 0.014.

The raw electrolytic iron is made ductile by heating which may be followed by rolling. The rolling process leaves the iron suitable for welding. Tubes annealed in magnesia for two hours at 900 deg. C. show a tensile strength of 43,950 to 46,650 lbs. per sq. in., and elongation of 40.3 to 43.1%.

Tubes made by this process are now in common use. One French company produces them up to 16 ft. long, 7 ins. in diameter and .25 in. in thickness. In the manufacture of tubes the deposit is made on a metallic mandrel. Tube and mandrel are then annealed and the mandrel is withdrawn.

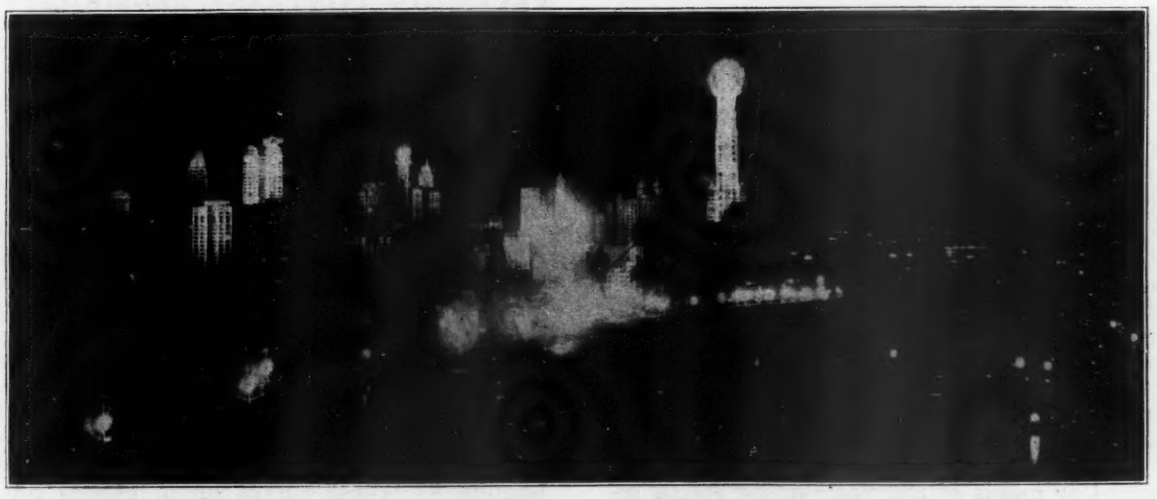
Regular plate can also be made without rolling, and such plates are particularly valuable where their magnetic and low hysteresis properties can be utilized; for instance, in d-c. and a-c. motors, transformers and dynamos. Electrolytic iron can successfully compete with the best Swedish irons for several reasons. It can be produced with regularity and when freshly made it is brittle and can be readily broken up for remelting. Its use as raw material for the manufacture of tool steels and special steels has given satisfaction.

PRODUCTION OF MOLDED INSULATION INCREASING.

Developments and Production Methods Inaugurated During War Period Big Factor in Supplying Demand for Synthetic Insulation.

"Quite some time before the war," said R. C. Cole, electrical engineer, Johns-Pratt Co., Hartford, Conn., in a recent statement regarding the field for molded insulation, "a new impetus was given to the manufacture of molded insulation by the introduction of synthetic compounds which permitted of the accurate molding of a great variety of pieces for which the older molding compounds were unsuitable. When hostilities broke out there was an immediate and urgent necessity for the production of an unprec-

Illuminated Manhattan Under the Rays of a Giant Searchlight



Above is an unusual view of the lower part of New York City, the photograph being taken at night by the aid of the rays from the Sperry gyroscope searchlight, mounted in Brooklyn, and shows the result on a photographic plate as the rays slowly swept lower Manhattan across the East river. The Woolworth building, Singer Tower and other skyscrapers, which are illuminated by floodlighting, stand out prominently, while the Brooklyn bridge can be distinguished in the foreground.

edented number of insulation parts for every conceivable kind of electrical apparatus. Naturally the most important of all were the parts for gas-engine ignition systems. Transportation and yet more transportation was the crying need of the army in France and in this country. Aeroplane development required the very best equipment that could be devised. The war supplied the urge that the industry needed to rehabilitate itself along new lines.

"Standardized production methods were of absolute necessity if the equipment was to be delivered in time for it to be of use abroad. Never before was there such a thorough study of all the factors entering into the manufacture of this line of material. The automatic press, which was beginning to make its appearance in most shops came into its own and made possible an aggregate production never before thought possible. Naturally the stress under which every one worked crowded into the space of a few months improvements in equipment and molding methods which under other circumstances would have taken a great many years to accomplish.

"When the armistice was signed there was a temporary lull in business, but within a few months manufacturers of molded products found themselves flooded with orders for the very parts that the experiences of the war period had taught them to make in a most economical and satisfactory manner. Prices increased not because of the demand but because of the higher cost of material and labor. That they are not higher is because of the improved methods employed in production.

"Molded synthetic compounds have in the short space of about five years almost entirely supplanted vulcanized fiber and hard rubber for automobile ignition and lighting equipment insulation parts. The growth of the business has been phenomenal. It is on a very firm basis today."

FEATURES OF LARGEST ELECTRIC LOCOMOTIVE.

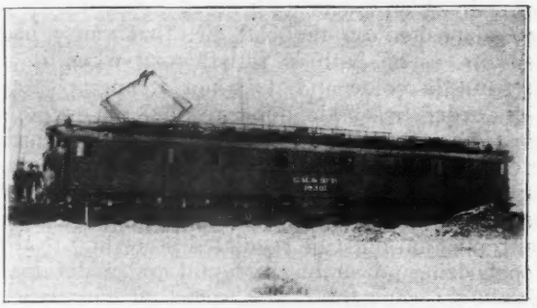
Motors Rated at 3480 Hp. for Continuous Operation, with Nine Running Speeds, Arranged for Regeneration.

Operating and construction features of the new Westinghouse electric passenger locomotives recently placed in service on the electrified lines of the Chicago, Milwaukee and St. Paul Railway contain interesting information. These locomotives, which are claimed to be the largest and most powerful electric passenger locomotives, weigh 275 tons, and are rated at 4200 hp. for 1 hr. and 3400 hp. for continuous operation. They have a maximum speed of 65 mi. per hr. On full field connection of motors, the tractive effort is 66,000 lbs. for 1 hr. and 49,000 lbs. continuously.

Flexible control for passenger service is obtained by means of the nine running speeds secured in three steps, first, by connecting the six motors in series and then shunting their fields in two separate notches, and third, by connecting three motors in series, three in parallel and shunting the fields in two separate notches. For conserving energy down grades, regeneration can be accomplished at three different speeds.

Safety and ease of control are obtained by placing the control apparatus in separate compartments in the cab so that all of the high-voltage apparatus is isolated from the low-voltage equipment. The main circuit high-voltage switches are of the unit type and are electropneumatically operated.

Four of the armatures of the motors or two complete motors are always connected in series



One of the Largest Electric Locomotives, Recently Placed in Service.

across the 3000-volt energy supply so that normally there is never more than 750 volts between the brushes of each commutator. The motors are of the twin armature type, both armatures being geared to the same driving gear. The entire motor is mounted directly over the axle and is supported on the locomotive frame.

There are two axle-driven generators, which supply excitation for the main motors during regeneration, and are used to supply energy for the compressor and blower motor at all times during motoring.

Low-voltage control and energy for the auxiliary apparatus is supplied from a motor-generator set which has a storage battery floating across its terminals. This storage battery supplies energy for these circuits when the axle generator is not functioning.

PAPER ON CONTRAST SENSIBILITY OF THE EYE.

The Bureau of Standards, Washington, D. C., has issued a scientific paper (No. 366) on the "Constrast Sensibility of the Eye." To obtain data on this subject under conditions similar to those encountered in searchlight illumination, laboratory experiments were performed simulating as closely as possible actual conditions. An illuminated strip was projected on a field of known brightness. The length of the strip was increased from zero to a length just visible to the observer. The results obtained are expressed by curves showing the relation between (1) strip length (visual angle) and field brightness, for constant contrast between strip and field; (2) strip length and contrast between field and strip, for constant values of field brightness. These curves lie in groups consistent with each other, and those obtained for the two observers are similar. Copies of the paper may be obtained by addressing the Bureau.

EDITORIAL COMMENT

Lighting the Living Room Effectively

Residences constitute by far the largest class of buildings in any community and the conditions prevailing in them affect the largest number of persons. If any features of electric service to residences could be materially improved this would likewise benefit the largest number of people and incidentally bring very substantial returns to the various branches of the electrical industry involved. Electric lighting is the oldest and still remains the principal feature of residence service. As compared with many other branches of lighting business it is also one of the most backward. Consequently improvement in residence lighting offers exceptionally favorable opportunities to electrical interests.

If the potentialities of this field are to be actively developed, the electrical men who are to do it must make a close study of its problems and must seek their solution without being bound by adherence to past or present practice in this line, which tends toward stereotyped fixtures, neglectful of the principles of good lighting as well as of good taste. One of the things to be achieved in residence lighting is to get away from monotony; another is to aim at securing lighting efforts rather than use of any particular fixtures or equipment, and finally to develop artistic possibilities latent in this field that those now having to do with it have apparently as yet little conception of.

We know of no one who has given more study to this entire subject from all angles than Mr. M. Luckiesh, of the Nela Research Laboratory, who has devoted special attention to it for many years and frequently written and lectured on it. Some two years ago he wrote a series of six articles for the ELECTRICAL REVIEW showing how science and art can be very effectively linked in lighting. At present he is contributing a new series applying these ideas particularly to residence lighting. In the third article of this new series appearing in this week's issue he gives special consideration to the lighting of the living room, which presents at the same time the most difficult problem in residence lighting and also the greatest possibilities for development.

The living room in a residence or apartment is usually its largest room and the one used most and for most varied purposes. Thus it serves at times for the entertainment of friends, as a music room or possibly for dancing, frequently for reading and quiet study, besides every day for all that is implied by the living room for the family. It is not uncommon to find the furniture rearranged to suit these various uses and it should be much more common to change the lighting to suit the occasion. To do this it is necessary to arrange for flexibility in the lighting by adjustment of the intensity of the illumination, change of the position of the light sources and therefor of the light distribution, perhaps also change of the color value and of the entire character of the lighting. Whatever is done, however, must be accomplished without violating the fundamentals of good lighting and the canons of good taste, which makes it seem to be a difficult problem.

To its solution Mr. Luckiesh turns with customary vigor and presents a large number of constructive ideas. He finds, for instance, that the liberal provision of wall and floor receptacles permits the use of portable table and floor lamps, which, if well chosen, enable one to secure nearly all of the lighting effects alluded to and also pleasing decorative effects from the portables themselves. Wall brackets should be provided for decorative effect only. It is not imperative to provide ceiling fixtures, but ceiling outlets should be arranged for in the wiring so that fixtures may be added later if desired.

In his advocacy of liberal wall outlets, Mr. Luckiesh does not touch on their incidental convenience for appliances because he concerns himself with lighting primarily. However, a generous provision of such outlets permits securing not only many charming lighting effects, but also makes it more certain that electrical appliances will be more freely used, which is all the more reason why the electrical interests should bestir themselves in rehabilitating the electrical facilities of the home.

Gaseous Conductor Lamp Globes

When D. McFarlan Moore prefaced his lecture at the meeting of the New York Section of the American Institute of Electrical Engineers, March 26, with the prediction that the lamp bulb with the solid conductor will, perhaps more quickly than many people imagine, be supplanted by that containing a gaseous conductor, he might have been considered visionary by one not conversant with the results of recent research. But

when he had finished his lecture and demonstrated the result of his twenty-five years of research, even the most conservative mind was convinced that there was basis for his prediction. It is the optimism of experimenters that convinces them of the soundness of their predictions. But it is the ability to demonstrate their accompilshments by actual experiments that convinces others. The demonstration by Mr. Moore left nothing to be desired as a convincing argument.

When the gas conductor lamp is finally perfected, there is little doubt in Mr. Moore's mind that it will supplant the filament bulbs used at present. Nearly every characteristic of it is more desirable than the corresponding characteristic of the solid filament bulb. Much of the encouragement that the gas conductor bulb holds out is attributable to the discovery of neon. After years of experimentation, during which Mr. Moore battled with perplexities that would have discouraged less hopeful investigators, this gas came as a solution of many of his problems. With its discovery and commercial production, the development of the gas conductor bulb received its most important impetus. Some of the characteristics of the gas are that it is unusually economical of energy, that it is cheap and plentiful, that the light from it is ideal for the eye, and that it has a large conductivity. Moreover, the neon-filled globes can be operated on direct or alternating-current circuits with identical efficiency and with a power-factor of 85%. Because the temperature of the internal parts, which are not in contact, is less than red heat, the danger from fires and gas explosions is minimized. What is of great importance in the development of these gaseous conductor bulbs is the possibility of the discovery of gases even more suitable than neon. The laws of physics already point to a discovery of this kind.

It seems almost incredible that any lighting devices can be developed that will be superior to those in use today. The history of scientific development, however, is a record of continuous progress during which many devices, in their day considered the acme of perfection, have been supplanted by improved devices.

The Value of Proper Lighting

The increasing activity by the Illuminating Engineering Society to improve the status of lighting, industrial and domestic, is particularly well timed and will, no doubt, be instrumental in improving a situation that is in some respects archaic. Heretofore lighting equipment has been installed largely by rule of thumb without any intelligent effort to apportion the illumination to the need for it. The effort, generally, has been directed toward providing light, more in some instances and less in others, according as the architect who arranged the equipment thought convenient or as the owner who would pay the bills directed. That light is a quantitative phenomenon absorbed by the human body that should be dosed just as any other stimulant and that may be administered in quantities insufficient or oversufficient to cause the most satisfactory reaction seems to have escaped notice. Recent tests show the importance of this consideration.

An investigation conducted recently by the Commonwealth Edison Co., of Chicago, to determine the effect on laborers caused by improper lighting has demonstrated, not only how seriously it affects their physical and, consequently, their working ability, but also how generally it exists in industrial plants.

Some of the astounding results from another investigation show that the lighting provided in 69% of 446 industrial plants investigated was unsatisfactory although those responsible for the operation of the plants thought that it was effective and adequate; that a slight increase in light in one plant caused a 15% increase in production; that merely an improvement in lighting caused a 20% increase in production in one plant and a 12% increase in another; and that the installation of a proper lighting system in a tannery caused an 80% reduction in rejections in the finishing department. It will be seen that improper lighting does not mean insufficient light.

This array of figures, though compiled in an industrial area that was partly local, probably represents conditions generally. There is no reason to suppose that industrial lighting has had any more attention in other places than it has had in this area. It is conceivable, in fact, that in many places conditions may be even worse than those represented by the figures disclosed. Whatever the general situation may be, the figures indicate that industrial lighting conditions are unsatisfactory as much for the owner of an establishment as for the employes. Until recently the principal arguments for proper lighting in industrial plants have been based on the fact that it contributes to the health of employes and to the reduction of accidents. The preceding figures show that it can be based on the additional fact that it contributes to the welfare of both employer and employe by increasing production—an important factor in these days of inflated prices—as well as by reducing the number of accidents. With these figures at its disposal the Illuminating Engineering Society has convincing weapons in its campaign for scientific lighting.

CURRENT EVENTS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

DEMAND FOR SPACE ON CONVENTION TRAINS IS HEAVY.

Large Attendance at N. E. L. A. Convention Forecasted by Large Number of Reservations on Special Trains.

Record-breaking attendance at the Pasadena convention of the National Electric Light Association is forecasted by the number of reservations being received at the association headquarters in New York City.

Not only is space in the three special trains to be run from the east being rapidly filled, but arrangements have had to be made for special cars from many cities from which members already have signified their intention of attending the convention in numbers sufficient to make this necessary. At present plans have been perfected for the placing of special cars at Boston and Chicago to be attached to the "Red Special," which is the 30-day tour de luxe, with a probability that another car will be placed at Detroit.

Cars will be placed at Pittsburg, Chicago, and Omaha, to be attached to the "Pink Special," and cars for attachment to the "Blue Special" will be placed at Chicago, Kansas City and Denver.

In addition to these specials, the Pacific Northwest members will attend in numbers sufficient to necessitate the chartering of a special train, starting at Seattle. Members in the Southwest expect to have sufficient representation to charter a special car to be attached to a regular train.

Master of Transportation George W. Elliott, has appointed the following as assistants in charge of reservations for the "Red Special": Charles B. Burleigh, General Electric Co., Boston; J. C. McQuiston, Westinghouse Electric & Manufacturing Co., East Pittsburgh; A. H. Manwaring, Philadelphia Electric Co., Philadelphia; Godfrey H. Atkin, Electric Storage Battery Co., Chicago; Robert Sibley, *Journal of Electricity*, San Francisco; Charles A. Collier, Georgia Railway & Power Co., Atlanta; and Thomas O. Kennedy, Denver Gas & Electric Light Co.

INCREASED EARNINGS SHOWN BY CENTRAL-STATION COMPANIES.

Soundness of Industry Is Shown in Ability to Adjust Itself to New Conditions and to Increase Business.

The intrinsic soundness of the electric light and power business, says the *Wall Street Journal*, has been demonstrated by results achieved under the extraordinary stress of the last five years. Electric companies have proved beyond all question that their rates are sufficiently flexible to permit gradual readjustment of income to meet successfully changes in conditions and increases in cost of labor and materials.

A study of results achieved by companies furnishing electric light and power shows that the effect of the increases in labor and material costs growing out of war conditions is being successfully overcome. Comparison of net earnings reported for 1919 and 1918 by a number of companies in different parts of the country, selected at random, follows:

	1919	1918	Inc.
Philadelphia Electric Co.	$5,879,630	$4,628,209	$1,251,421
Metropolitan Edison Co.	856,982	672,405	184,577
Penn Water & Power Co.	1,299,256	1,255,836	43,420
Alabama Power Co.	1,736,945	1,572,249	164,696
Southern California Edison Co.	2,943,569	2,443,465	500,104
Blackstone Valley Gas & Electric	721,234	690,470	30,764
Connecticut Power Co.	504,152	397,660	106,492
Eastern Texas Electric Co.	536,673	469,593	67,080
Mississippi River Pr. Co.	1,799,325	1,766,406	32,919
North Texas Electric Co.	1,352,937	1,160,927	192,010
Tampa Electric Co.	507,594	442,270	65,324
Brooklyn Edison Co.	3,351,012	2,691,857	659,155
Consumers Power Co. (Mich.)	3,624,625	2,792,595	832,030
Cumberland Valley Power & Light Co.	954,666	925,736	28,930
New England Power & Light System	1,512,088	1,322,881	189,207

URGES ENGINEERS TO TAKE INTEREST IN PUBLIC AFFAIRS.

Samuel Insull Points Out Necessity of Such Action at Luncheon of Western Society of Engineers at Chicago.

The Western Society of Engineers has inaugurated a series of monthly noonday luncheons, the first of which was held at the Hotel Morrison, Chicago, on April 2, more than 500 members being present. At the luncheons short talks will be given by men prominent in the engineering and industrial fields.

The speaker at the first luncheon was Samuel Insull, president of the Commonwealth Edison Co., Chicago, who had as his subject, "The Engineer's Influence in Public Utilities." He was listened to attentively by the engineers present as he told them how they could work to aid themselves and the communities in which they lived by using their engineering and technical knowledge by extending that knowledge to take in the public affairs of the nation, state and municipality. Mr. Insull said in part:

"In times like we are going through at present there is nothing we need so much as a knowledge of public affairs. The average politician makes the wildest of statements and most absurd claims, and in most instances they go unchallenged. If engineers would apply their powers of reasoning and take some interest in public affairs a vast amount of good would result to the public at large.

"Take the public utility field, transportation,

the telephone and electric light companies and other organizations serving the public. In their case the politicians and the average muncipal officers will tell you that all questions relating to such utilities are subject to home rule, when, as a matter of fact, it is well known that the stage of home rule in practically all public utilities has passed and they have become state and largely interstate propositions.

"If we are to have economy of operation, public utilities must be more than a one-city, or one-section affair, and must be handled by whatever governing body of city or state in control with this idea in mind."

Mr. Insull then referred to a recent editorial in the *Chicago Tribune* in which the need of public utility corporations branching out, expanding and working together was shown. Mr. Insull quoted from the editorial as follows:

"'Take the most conspicuous example, public utilities. We have talked much of local self-government in these utilities, but they are not local, and the whole irresistible tendency is to make them less and less local. Our transportation system is no longer local. The extension of the suburbs makes necessary communications having their terminals within Chicago and their ramifications half way across the state. The city is but the center of a steadily growing network of electric lines of power for transportation and communication, trolley lines, electric light lines, telephone lines. And we are only beginning this development. In the future our power will be developed at mines outside of the city, at hydroelectric plants outside the city. These are not local interests. The unit of organized life of which we are a part is not the city and its control cannot be vested in the city.'

"Many of us," continued Mr. Insull, "have been preaching this doctrine for the past 25 years, but the only reply we have received was that we were representing 'the interests' and were working for our own benefits. My claim is that engineers, with their education and technical and general knowledge should have reasoned this out long ago and have become leaders in such thought in Chicago or wherever else they might live.

"Instead of this happening we, who have urged this thing, have been more or less liable to receive unfavorable criticism from engineers because they had not looked into the subject. I do not know of anything that more vitally concerns the success and general development of a community than public utilities. Their treatment and handling by the community is far more important to the community than it is to the owners of the utility, for the very success of a city, its growth, industry and all else depend on public utilities, whether they be city, state or interstate.

"It should be the mission of the engineers to bring subjects of this kind home to the people of our city and state; to show them the political conditions and how in almost every instance a statement made politically against a public utility corporation is either not founded on facts at all or if founded on facts the facts are so distorted that all sight of the truth is lost.

"The railroads were starved by the Interstate Commerce Commission until the government had to take them over during the war to enable them to function properly. The public utility companies are being handled in much the same way. Municipalities have forced utilities to supply them service for less than the necessary cost for labor, material and interest on investment. These things cannot be done and efficient service maintained at the same time. Properties are being sacrificed, and nothing hurts a community more than the crippling or injuring of its public utility corporations.

"Engineers in any community now have their opportunity. They should not confine their efforts to technical and scientific matters, but should become familiar with all the duties of citizens. It is your duty, not alone your privilege, but your duty as engineers and citizens to so post yourselves that you may use your power to exercise the right kind of influence in the community."

ELECTRICAL MATTERS BEFORE U. S. CHAMBER OF COMMERCE.

Several matters of interest to the electrical industry will come up for discussion at the meeting of the United States Chamber of Commerce at Atlantic City, N. J., April 27-29. President R. H. Ballard of the National Electric Light Association has appointed John W. Lieb, vice-president of the New York Edison Co., as national councillor to the Chamber of Commerce for the N. E. L. A. and R. E. Breed, president of the American Gas & Electric Co., as vice national councillor.

The following have been appointed as delegates to the Chamber of Commerce convention: William F. Ham, president, Potomac Electric Power Co., Washington, D. C.; J. B. McCall, president, and W. H. Johnson, vice-president, Philadelphia Electric Co.; Thomas N. McCarter, president, Public Service Electric Co., Newark, N. J.; M. S. Sloan, president, Brooklyn Edison Co.; F. W. Smith, vice-president and general manager, United Electric Light & Power Co., New York City; H. A. Wagner, president, Consolidated Gas, Electric Light & Power Co. of Baltimore, and T. W. Wilson, vice-president and manager, Wilmington & Philadelphia Traction Co., Wilmington, Del.

A. I. E. E. URGES SALARY INCREASES IN PATENT OFFICE.

The American Institute of Electrical Engineers, through the Patents Committee of the Engineering Council, is working to aid the passage of House of Representatives bill No. 11984, introduced by Congressman John I. Nolan, chairman of the House Patent Committee, which provides for increases in salaries and to the size of the staff of the United States Patent Office. Under the bill the salaries of principal examiners in the office are raised from $2750 to $3900. The bill has passed the House and is now before the Patent Committee.

The Engineering Council at a recent meeting passed the following resolution: "Resolved, that the chairman be authorized to arrange for sending notice by letter to the several societies

represented on the engineering council, urging them to use their influence in favor of the increase in salary and staff proposed in the Nolan bill, H. R. 11984."

The Engineering Council Patents Committee is sending a circular letter to all A. I. E. E. members asking them to support the bill by writing to the senators from their respective states and as also to Senator George W. Norris, chairman of the Senate Committee on Patents. The letter is signed by Edwin J. Prindle, secretary, Patents Committee, National Research Council; Charles A. Terry, acting chairman, Patents Committee, Engineering Council, and Frank N. Waterman, representative of the A. I. E. E. on Patents Committee of Engineering Council.

GENERAL ELECTRIC CO. BUSINESS IN 1919 TOTALLED $229,979,983.

Chairman C. A. Coffin Announces That Demand for Products Exceeds Capacity—Unfilled Orders Total Almost $100,000,000.

The General Electric Co., Schenectady, N. Y., in its annual report for the fiscal year ended Dec. 31, 1919, shows profits available for dividends, after taxes and all charges are deducted, of $25,077,970, equal to 20.8% on $120,557,200 capital stock outstanding on Dec. 31 last. Cash dividends of 8% and of 4% in stock were paid during the year.

These earnings compare with $17,104,982, or 14.7% on $115,874,800 capital stock in 1918, and $26,903,828 on $101,512,500 capital stock in 1917. Sales for the year totaled $229,979,983, compared with $216,815,277 in 1918 and $196,926,317 in 1917.

The income account compares as follows:

	1919	1918
Net sales	$229,979,983	$216,815,277
Operating expense	196,855,683	188,439,522
Operating income	33,124,300	28,375,755
Other income	5,230,921	4,606,315
Net income	38,355,221	32,982,070
Interest	2,277,250	2,377,089
Taxes	11,000,000	13,500,000
Profits available for dividends	25,077,971	17,104,982
Cash dividends	9,545,469	9,165,622
Surplus	15,532,502	7,939,360
Previous surplus	53,250,661	49,898,699
Stock dividends	4,772,918	4,587,389
Total surplus	64,010,245	53,250,661

Stock dividends of 4% were paid in 1919 and 1918, and 2% in 1917.

In his annual report to the stockholders C. A. Coffin, chairman of the board of directors, says in part: "The value of orders received in 1919 was $237,623,932, compared with $234,134,037 for the year 1918. For some months succeeding the armistice, the volume of business was much curtailed, but during the last eight months of the year orders steadily and rapidly increased, so that the present demand for the company's products is greatly in excess of the capacity of its factories. At the close of the year the amount of orders unfilled was $98,880,000, compared with $80,000,000 at the end of 1918.

"The great increase in orders for all classes of apparatus manufactured by the company makes it necessary to add substantially to its manufacturing capacity. This is being accomplished partly by enlarging present plants and in part by purchasing, or leasing with option to purchase, factories already constructed which offer immediately available facilities, thus enabling the company to secure an earlier output than would be possible by erecting and equipping new factories of like capacity.

"Expenditures for additional land, buildings, machinery and other equipment during 1919 amounted to $14,462,285. The sum of $7,688,893 has been written off plant account or added to general plant reserve, making the net increase in the book value of plant and equipment $7,773,392. The total factory space in recent years has been increased from 12,160,000 sq. ft. in 1912 to 20,681,000 sq. ft. in 1919.

"Careful examination has been made of the investment securities now carried at $51,142,309. This is an increase of $10,312,096 over the book value at the close of 1918, representing principally investments in affiliated corporations and in subsidiary manufacturing enterprises."

MINIATURE NEWSPAPER USED TO ADVERTISE LOUISVILLE SHOW.

Although the Louisville Electrical Exposition is several months off, the promoters are already using whole newspapers in exploiting the exposition. True the newspapers are miniature ones, but the advertising is having its effect just the same. At the April 5 meeting of the Louisville

LOUISVILLE ELECTRIC CLUB EXTRA

The Courier-Journal AND THE LOUISVILLE TIMES

DON'T FORGET THE DATES OCT. 25-30

VOL. I. MONDAY, APRIL 5, 1920. NO. 1.

"PRESIDENT" RILEY

The Electric Show Will Be Held In the Armory October 25-30 Inclusive

The Electric Appliance Business Is Booming In Louisville

A. B. O'Day To Speak On Illumination

"GENERAL" BOB MONTGOMERY

Speaking of Songs How Is This One?

First Page of Miniature Newspaper Advertising Next Fall's Electrical Exposition to Be Given Under Auspices of Louisville Electrical Club.

Electric Club, which is sponsor for the exposition to be staged in the Jefferson County Armory, Oct. 25-30, copies of the *Courier Journal and Louisville Times* were distributed, the copies bearing the caption "Louisville Electric Club Edition," with A. R. Magee, of the club, acting as editor.

The four-page newspaper, the front page of which is reproduced herewith, was filled with items of interest to the electrical trade and contained numerous cartoon drawings of prominent

members of the club. The exposition will be in charge of Robert Montgomery as manager, who has acted in a similar capacity at the two previous electric shows held in Louisville. J. B. Riley, president of the Electric Club, is at the head of the exposition committee.

SOFT COAL MINERS GET INCREASE IN NEW SCALE.

Under an award made by the Bituminous Coal Commission the general scale committee of operators and miners of the central competitive field (Pennsylvania) has entered into a two-year agreement with 200,000 bituminous coal miners. The agreement involves a wage increase of 27%, which is about $200,000,000 a year, making the total yearly amount the miners will receive as wages approximately $1,000,000,000. The contract became effective April 1.

Representatives of the mine operators in West Vinginia, Kentucky and other outlying districts not included in the central competitive field stated the new contract would be put into effect in their territory at once.

The agreement continues in effect the eight-hour day now observed in the soft coal regions. One feature of the new contract is a clause that provides that all "internal differences" in the various districts of the bituminous coal fields will be settled by the district officers of the mine workers and operators. There must be nothing done, however, in adjusting these matters that will increase the cost of production or decrease the earning capacity of the mine workers. The bonus system now used by operators in competing with each other is condemned, and the contracts provide that all agreements in the various districts should contain a "penalty" clause for any "stoppage of work" or unauthorized strikes.

SCHENECTADY ENGINEERS DISCUSS COMMUTATOR MOTOR.

B. G. Lamme, chief engineer of the Westinghouse Electric & Manufacturing Co., was the speaker at the meeting of the Schenectady Section of the American Institute of Electrical Engineers, held April 2. Mr. Lamme's subject was "The Alternating-Current Commutator Motor," in which he outlined the history of the development of the a-c. commutator motor. He contended that the commutation problem in a-c. motors is the same as for d-c. when all e.m.fs. are taken into account. The consideration of the different e.m.fs. which should be taken into account with the various types of d-c. commutator motors was discussed and it was shown that in a general way the e.m.fs. involved in speed control also appear in the commutator problem.

ARKANSAS UTILITIES ASSOCIATION TO HOLD MEETING.

A long program has been arranged for the annual convention of the Arkansas Utilities Association, to be held in Hot Springs, Ark., April 26-28, with the Arlington Hotel as headquarters. On the first day of the convention Gov. Charles H. Brough of Arkansas will speak on "Arkansas' Attitude Toward Public Utilities." Following this will be a paper on "Lightning Protection" by J. L. Buchanan, president of the Wesco Supply Co., St. Louis, Mo. The afternoon will be given over to an inspection of Hot Springs utilities.

The program for April 27 includes papers on "Underfeed Stokers" by O. P. Barnell, of the Westinghouse Electric & Manufacturing Co.; "Coal vs. Oil," by P. W. Thomas, Arkansas Light & Power Co., Pine Bluff, Ark., and "Present-Day Operating Problems," by W. G. Schmander, Texas Power & Light Co., Dallas, Tex. On the final day of the convention, Herbert R. Wilson, chairman of the Arkansas Corporation Commission, will deliver an address to be followed by a discussion on the topic, "Public Policy and Good of the Association." W. J. Tharp, Little Rock, Ark., is the secretary of the association.

ILLUMINATING ENGINEERS WILL ELECT NEW OFFICERS.

The nominating committee of the Illuminating Engineering Society, of which George H. Stickney is chairman, has prepared a list of nominees to be voted on at the coming annual election. The list follows:

President, Gen. George H. Harries; secretary, Clarence L. Law; treasurer, Louis B. Marks; vice-presidents: New England Section, H. F. Wallace; Philadelphia Section, G. S. Crampton; Chicago Section, J. J. Kirk; directors, Adolph Hartz, Walton Forstall and Frank S. Price.

Another matter to be voted on is the proposal to amend the constitution of the society so as to provide for the formation of local chapters. It is felt by the officers that more interest in scientific illumination can be developed if illuminating engineers in different localities can arrange meetings under the auspices of a national society than will be developed if meetings are held independently.

SUPREME COURT TO ACT IN MISSOURI CONTRACT CASE.

Decision by the United States Supreme Court in the case of the Kansas City Bolt & Nut Co. against the Kansas City (Mo.) Light & Power Co. will, it is expected, soon be handed down. Arguments by both sides have been completed and the case submitted to the court. The case involved several unusual features. A contract was entered into between the two companies concerned for the delivery of electrical energy, the contract being dated Sept. 7, 1912, this date being prior to the creation of the Missouri Public Service Commission, which was given rate-fixing powers.

The contract fixed the compensation and other conditions for a period of five years and also gave the consumer the option of renewing the conditions after the end of the five year period from year to year for a period of 10 additional years. After supplying power for three years the Kansas City light company insisted upon applying rates which had been fixed by the Public Service Commission. The lower courts, including the Missouri Supreme Court, have

refused to enjoin the Kansas City Light & Power Co. from withdrawing power from the manufacturing plant.

WESTERN MEN ATTEND N. E. L. A. MEETING IN NEW YORK.

Among those attending the Executive Committee meeting of the National Electric Light Association at the New York City headquarters on April 8 were A. Emory Wishon, San Joaquin Light and Power Corp., Fresno, Cal., president of the Pacific Coast Geographic Division, and John B. Fisken of the Washington Water Power Co., Spokane, Wash., president of the Northwest Electric Light and Power Association. Martin J. Insull of the Middle West Utilities Co., Chicago, first vice-president of the N. E. L. A., presided.

MORTIMER RESIGNS PRESIDENCY OF NORTH AMERICAN CO.

James D. Mortimer, president of the North American Co., which controls the Milwaukee Electric Railway & Light Co., the Detroit Edison Co., the Wisconsin Gas & Electric Co., the Union Electric Light & Power Co. of St. Louis, and other public utility properties, tendered his resignation, to become effective Nov. 1, at a meeting of the board of directors in New York City last week. He has been connected with the North American Co. for more than 10 years, first as vice-president and since 1914 as president.

W. N. Cromwell was elected chairman and A. B. Boardman a member of the board of directors.

SCHENECTADY A. I. E. E. HEARS TALK ON LARGE POWER PROJECTS.

"Power and Transmission" was the subject of an address by H. H. Dewey, of the power and mining engineering department of the General Electric Co., before Schenectady (N. Y.) Section, A. I. E. E., March 19. Mr. Dewey briefly outlined recent developments of some of the larger electric power projects with special reference to hydroelectric development, and discussed the trend of future developments in power generation and transmission.

TWO SOUTHERN STATES ADDED TO GEOGRAPHIC DIVISION.

The state electrical associations of Tennessee and Mississippi were taken into the Southeastern Geographic Division of the National Electric Light Association at a meeting of the executive committee of the division held in Raleigh, N. C., April 1.

ELECTRIC POWER CLUB WILL HOLD CONVENTION IN MAY.

The Electric Power Club will hold its annual convention at the Signal Mountain Hotel, near Chattanooga, Tenn., May 5 to 8, inclusive. The club is composed of manufacturers of motors, generators, transformers and industrial control apparatus and the business of the convention will be confined to papers and discussions on these subjects. C. H. Roth, 1400 West Adams street, Chicago, is secretary of the club.

CONDUCTION OF LIGHT DISCUSSED AT NEW YORK.

D. McFarlan Moore was the speaker at a meeting of the New York Section of the American Institute of Electrical Engineers in the Auditorium Engineering building, New York City, March 26. The subject of the paper presented was "Gaseous Conduction of Light from Low Voltage Circuit," which was illustrated with lantern slides and demonstrations.

NORTH CENTRAL N.E.L.A. EXECUTIVE COMMITTEE TO MEET.

The Executive Committee of the North Central Geographic Division of the National Electric Light Association will meet at Minneapolis, Minn., April 13, and will be addressed by M. H. Aylesworth, executive manager of the N. E. L. A. Representatives will be present at the meeting from the state associations of Minnesota, North Dakota and South Dakota, and at that time will fix the date of the first conference of the Geographic Division, which will be held subsequent to the May convention of the N. E. L. A.

COMING CONVENTIONS.

Arkansas Utilities Association. Annual convention, Hot Springs, Ark., April 26-28. Headquarters, Arlington Hotel. W. J. Tharp, secretary, Little Rock, Ark.

American Association of Engineers. Annual convention, St. Louis, Mo., May 10 and 11. Headquarters, Planters Hotel. Secretary, C. E. Drayer, 63 East Adams street, Chicago.

Electrical Supply Jobbers' Association. Twelfth annual convention, Del Monte, Cal., May 12-14. Franklin Overbagh, general secretary, 411 South Clinton street, Chicago, Ill.

Southwestern Electrical and Gas Association. Annual convention, Galveston, Tex., May 13-15. Headquarters, Hotel Galvez.

National Electric Light Association. Annual convention, Pasadena, Cal., May 18-21. Headquarters, Hotel Huntington. Acting secretary, S. A. Sewell, 29 West 29th street, New York City.

Missouri Association of Public Utilities. Fourteenth annual convention, Jefferson City, Mo., June 3-5. Secretary, F. D. Beardslee, St. Louis, Mo.

American Institute of Electrical Engineers. Annual convention, White Sulphur Springs, W. Va., June 29-July 2. Headquarters, The Greenbrier. F. L. Hutchinson, secretary, 33 West 39th street, New York City.

Ohio Electric Light Association. Annual convention, Cedar Point, Ohio, July 13-16. Secretary, D. L. Caskill, Greenville, Ohio.

Pacific Coast Section, American Institute of Electrical Engineers. Annual convention, Portland, Ore., July 21-23.

National Association of Electrical Contractors and Dealers. Annual convention, Baltimore, Md., Oct. 6. Secretary, W. H. Morton, 110 West 40th street, New York City.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

MINNEAPOLIS GENERAL ELECTRIC CO. ADDS NEW BUSINESS.

Reports from the sales department of the Minneapolis (Minn.) General Electric Co., show that during the week ended March 12, 1920, 321 new electric light and power customers with

View in Salesroom of Minneapolis General Electric Co.

200 kw. of lighting and 553 hp. in power and heating business was taken on by the company. Energy for electric ranges in a new apartment building is responsible for 208 of the 553 hp. New business connected to the company's lines shows an increase of 149 customers with 148 kw. of lighting and 216 hp. in motors. Electrical energy output for the company was 9.8% greater than for the corresponding period in 1919.

MAKE USE OF MOVING PICTURES AS EDUCATIONAL AID.

Moving pictures have frequently been used to educate the public in various ways, but it has remained for the Philadelphia Electric Co. to adapt the moving picture industry as an aid to educating the public to "do it electrically."

The company has recently inaugurated an educational lecture service that has met with success in Philadelphia and its environs. The lecture consists of a series of informal talks, illustrated by interesting and unique motion pictures and "still" pictures, these covering the application of electricity in the home, showing its various possibilities and telling in a general and understandable way how to "do it electrically."

The Philadelphia company offers this lecture and picture show to churches, schools, clubs, civic improvement associations, business men's and neighborhood associations or any organization that has to do with community interest. The lecture and pictures are furnished free by the company

Several large central-station companies have become interested in the plan and have written the Philadelphia company asking for details of the work. It is possible that these illustrated lectures will be given in various cities throughout the country.

PACIFIC POWER & LIGHT RESUMES PUBLICATION OF BULLETIN.

The Pacific Power & Light Co. has resumed publication of its monthly *Bulletin* with the March issue, a 50-page booklet filled with interesting facts concerning the activities and personnel of the company.

In an article dealing with the sales department it is stated that the showing for 1919 in appliance sales was very satisfactory. Gross sales for 1919 show an increase over 1918 of 45%, following the adoption early in 1919 of the policy of selling electrical merchandise at list prices. During 1919 the company sold a total of 4714 electrical appliances as compared with 3227 in 1918.

Lamp sales in 1919 were greater than in any previous years and the outlook is that 1920 will surpass 1919. Mazda lamps are the staple in the company's business and their sales have been helped by window trims and many other novel and attractive forms of visual advertising.

SALESMAN GIVES COMPANY OBLIGATIONS TO THE PUBLIC.

Interesting Points Brought Out in Prize-Winning Paper in Empire State Gas & Electric Association Contest.

Some points brought out in a paper submitted by E. J. Murphy, a salesman of the New York & Queens Electric Light & Power Co., Flushing, N. Y., who won a prize in a recent contest promoted by the Empire State Gas & Electric Association, are well worthy of notice by all central-station companies.

The papers submitted were on the subject "Our Obligations to the Public." Mr. Murphy's paper follows:

"It is a fundamental of central-station business that the thing actually sold is something more than electrical energy. Electricity is sold today with an implied guarantee of perpetual good service, and it is the business of the operating company to see that the consumer gets it and not to rest when the contract has been signed. Therefore, the chief obligation of any utility to the public is service.

"To institute a service of the highest character it is necessary that a utility have executives who are of broad mind and liberal training, and who, in addition to having ability that will effect economy in the operation of their

business, must carry out the principles of fair and honest dealings at all times and have a sympathetic attitude toward the public and toward their employes in their everyday activities and relations.

"Utilities can fulfill the obligation of giving the best service by: (1) Keeping their distribution circuits in good condition; (2) eliminating antiquated meters and other apparatus; (3) avoiding lax methods in rendering, modifying and collecting bills; (4) keeping their voltage uniform and the rating of lamps uniform; (5) educational efforts to interest the public in the way light is to be used, in addition to the question of how much is consumed; (6) avoiding charges of inferior service; (7) it is imperative that a public service corporation gives good service. Any other policy is destructive of public confidence, without which there is no success.

"The obligations of employes in giving service are: (1) It should be remembered that the company is operated for the benefit of its customers; (2) employes are at all times at the service of the public; (3) customers should be greeted with a smile and a cheerful word; (4) customers must leave your department feeling pleased with the service rendered; (5) if you cannot handle a customer's complaint properly, ask for assistance; (6) in answering the telephone be courteous, brief and accurate; (7) thoroughly familiarize yourself with every detail of your work, thereby creating confidence that you know your business; (8) be enthusiastic; it is one of the essentials of success."

BROOKLYN CO. CHANGES METHOD OF HANDLING COMPLAINTS.

A radical change in the method of handling customers' complaints and of requests for information has been made by the Brooklyn Edison Co. A bureau called the "Service Information Bureau" has been organized and located in the old Edison shop on Pearl street. This bureau now handles all complaints and requests for information from customers, whether by mail, telephone or personal call.

The bureau is a part of the sales department, as that department of the Brooklyn Edison Co. handles all relations with customers. No matter what the complaint is, or what information is desired, the customer is taken care of at the bureau and not forced to go from one department to another seeking the proper place to make his business known.

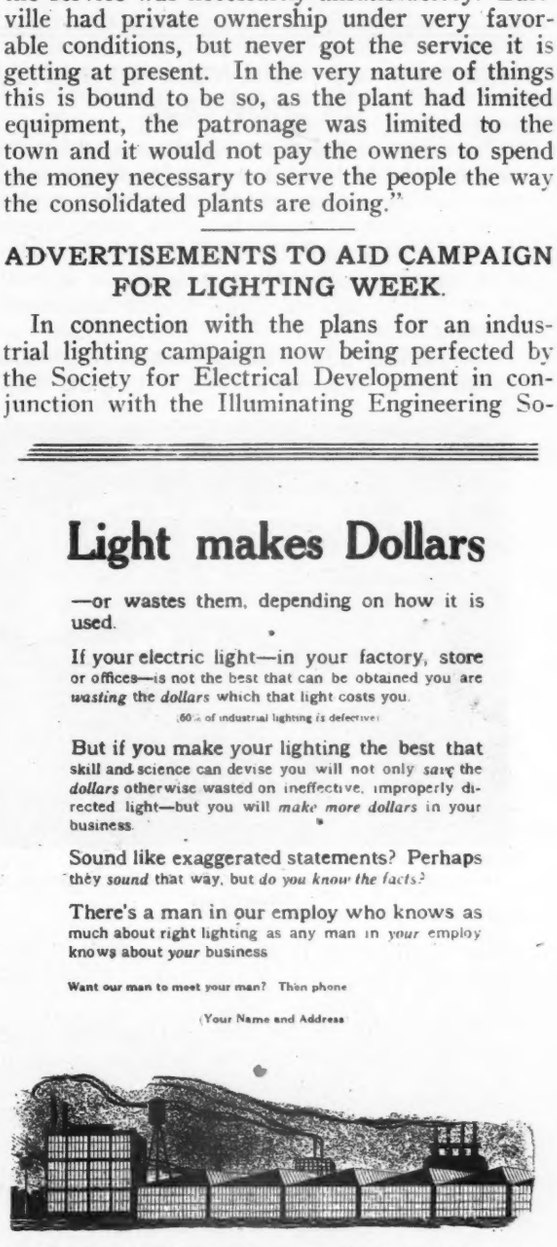
NEWSPAPER DISCUSSES CENTRAL-STATION SERVICE FOR FARMERS.

In discussing the extension of electric light and power service to the farms of Illinois, the Earlville (Ill.) *Leader* recently made the following statement:

"Some of the farmers are of the opinion that it will be cheaper for them to club together and build their own electric plants, but we believe when they study the question they will find that such a step is well nigh impossible and certainly impracticable. The utility companies of the state have invested millions of dollars and are now getting into shape to give good service, something that was not possible when every town has its small private or city-owned plant. In those days the service was governed by local conditions. If the plant was in good shape and had a good patronage, it was kept in repair and fair results were obtained. If the patronage was inadequate the plant soon deteriorated and then the service was necessarily unsatisfactory. Earlville had private ownership under very favorable conditions, but never got the service it is getting at present. In the very nature of things this is bound to be so, as the plant had limited equipment, the patronage was limited to the town and it would not pay the owners to spend the money necessary to serve the people the way the consolidated plants are doing."

ADVERTISEMENTS TO AID CAMPAIGN FOR LIGHTING WEEK.

In connection with the plans for an industrial lighting campaign now being perfected by the Society for Electrical Development in conjunction with the Illuminating Engineering Society and National Electric Light Association, suggestions for advertisements like the one given herewith are being sent to central-station companies, contractor-dealers, jobbers and manufacturers in all parts of the country, with the request that they be used before and during the week of the campaign.


Light makes Dollars
—or wastes them, depending on how it is used.
If your electric light—in your factory, store or offices—is not the best that can be obtained you are *wasting* the *dollars* which that light costs you.
(60% of industrial lighting is defective)
But if you make your lighting the best that skill and science can devise you will not only *save* the *dollars* otherwise wasted on ineffective, improperly directed light—but you will *make more dollars* in your business.
Sound like exaggerated statements? Perhaps they *sound* that way, but *do you know the facts?*
There's a man in our employ who knows as much about right lighting as any man in *your* employ knows about *your* business
Want our man to meet your man? Then phone
(Your Name and Address

One of the Advertisements to Be Used by Various Interests in Electrical Industry in Factory Lighting Campaign.

The committee in charge is also directing other publicity ideas and is furnishing information and advice of all sorts to the branches of the electrical industry in the promotion of better industrial lighting.

CONTRACTOR-DEALER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

DISPLAY OF DEVICES EFFECTIVE IN SHOWCASE.

The illuminating showcase illustrated herewith might easily be taken for a night view of a window display. That, in effect, is what a showcase so equipped really is. Few store interiors are as light as could be desired and most showcase shelving still further cuts off the light that is needed to call attention to the merchandise displayed.

A case like this is independent of other light conditions. It is not necessary to turn on full

Illuminated Show Case Sets Off Electrical Goods to Advantage.

store illumination to show off goods in them far from the front part of the store. Every article gets its full share of light.

Dealer helps in the forms of colored cut-outs are very effectively used in this case in conjunction with a display of vibrators. Good light diffusion is well shown from the unit reflectors which conceal the lamps.

ELECTRICAL DEVICES TO CONSERVE SPACE AND TIME.

All over the country, villages have become towns and towns have become cities as the result of war industry. The strain placed on the housing conditions has presented its crop of individual problems, but none so acute as in New York City. Manhattan has not only a population of several million who work in Manhattan by day and sleep in Brooklyn and elsewhere at night; there is the ever-increasing transit population to be considered. Every day in the year several hundred thousand visitors depart and arrive, and during the winter season the hotels are taxed to their utmost capacity.

As fast as one apartment house is erected there are tenants waiting for the architect to draw up the specifications for the next, so New York City is always a step behind in accommodating its constantly increasing population.

Since the war innumerable Government boards have made their headquarters in Manhattan. Add to this the many plants in the Metropolis given over to war contracts, and you will readily understand why New York has been hard pressed to take care of its new inhabitants—there being sufficient of them to populate a good sized town. Nor must the enormous growth of New York as a shipping center to Europe be overlooked. In this connection an Army Supply Base is now being built in Brooklyn at an approximate cost of $40,000,000.

A recent survey made by the New York Real Estate Board shows that the number of apartments built since 1913 has decreased each year. During 1913 there were 22,340 apartments built, but in 1917 the number of new apartments dwindled to 7689. This year the number is expected to dwindle still more, as during the first six months of 1918 plans for no more than 2000 apartments were filed. New York City now has a little less than a million apartment houses, and for this number there are only 7264 vacant flats. They are vacant chiefly because of the unending search for better apartments. An apartment is seldom vacant for more than a few weeks except during the summer when a great many Manhattanites take a cottage or bungalow at the beach or country.

Why few new apartment houses are going up is because of the difficulty of obtaining the building materials and the scarcity of labor. If these important factors were available, there would still be the greatly increased cost of construction to discourage building operations.

The housing problem is being partly solved by converting old-fashioned two, three and four-story houses, of which there are a great number, into small housekeeping units. Those who find it impossible to take up housekeeping are flocking to the rooming and boarding houses. Another way in which many families have solved the congested housing conditions is by taking a smaller apartment or house. This has meant that every piece of furniture, from bed to electric iron, must count. It has led to an unprecedented demand for all electrical household appliances that are time, labor and space savers. Housewives have not hesitated to scrap all antiquated household appliances which are inefficient because of space, time and age, replacing them with modern appliances which take up very little room considering their great efficiency.

Where increased housing facilities in a war-boosted town are limited, the electrical dealer, while pushing his regular goods, should single out all electrical household appliances which conserve space, time and labor—particularly the former—for special attention.

Business Hints for the Dealer

What a Dealer Learned About Selling Fixtures—Descriptions of Electrical Installations Make Material for Newspaper Publicity

When a certain dealer in a small city in the West first went into business he listened with receptive ear to a number of smooth salesmen who showed him how much money he could make on lighting fixtures. It looked remarkably good on paper. But there came a time when he decided to take his first inventory. The result opened his eyes. It gave him much food for reflection. He found that he was loaded up with a lot of expensive fixtures for which there was evidently no demand, with miscellaneous parts that had no affinity for each other, and with a fair amount of broken and antiquated glass that has cost him good money.

He began to think a great deal about his way of handling fixtures. He had been buying glass in one place, brass in another, sockets, wire and other parts somewhere else. That meant half a dozen salesmen to take up his time, half a dozen different kinds of orders to place, shipments to receive, accounts to pay and a lot of annoying freight, cartage and express charges.

Much space was required for boxes, barrels and the variety of clumsy-shaped fixture packages. Room was also required for a bench, and bins for fittings and parts, racks for stem pipe and casing.

Time Spent in Assembling Fixtures Is Lost for Selling.

This dealer had always reckoned that the time it took to assemble fixtures was not lost because he and his helpers did it between jobs—in time that he believed would otherwise have been wasted. But now he became real honest with himself and faced the facts. He or his men had to go round the shop gathering up one part here and another there, hunting all over the stock for something else, then put the fixtures together in the shop and test out, take them apart again before they could be sent out, and assemble them all over again on the job.

Many a customer who came into the store did not get the right kind of treatment, and often did not buy as much as he might have, because the dealer was in the midst of assembling a job and impatient to get back to it. He admitted he must have lost hundreds of dollars' worth of business in that way. And now he found himself with a lot of stuff on hand he never hoped to sell, and not enough of any one kind to make a proposition to any builder.

There came a Sunday when the dealer, feeling pretty blue and in doubt as to his future, paid a visit to an old friend who was in the same line of business in a neighboring city. The friend listened with sympathy and then took the dealer to inspect his store and manner of handling the business. There the dealer saw a great light. The friend's store was as different from his as daylight is from dark. He listened to the story of the friend's success, and discouragement gave way to bright hope.

Today there is a different story to tell. This dealer says he found that one of the secrets of rapid sales and quick turnover of capital lay in packaged goods, trademarked goods—goods that were nationally advertised—products the demand for which had already been created by the manufacturers' big campaigns.

Modern Methods in Fixture Business.

In the fixture end of the business the dealer who had thought himself a failure discovered a real moneymaker. This fixture had a catchy trade name, it was known for its lighting merits—providing an ideal combination of direct and indirect lighting, and offering practical means for use in the home as well as commercial installations. It had a whole lot of advantages, and proved a guide to the solution of his selling problems.

Now, instead of having to interview many salesmen and deal with a number of different firms to obtain the elements of a single fixture, he gets his fixtures complete and ready to install through his jobber. Thus he has one account, only one order to fill, and no freight or express charges.

In his stockroom there is a space 14 ft. long, 12 ft. high and 18 ins. deep, and in that space there is kept on hand more than 350 complete lighting units. Nowadays the dealers does his work at his desk instead of at a bench—he doesn't have any assembling to do. On small orders he does not have to hire a wagon. A small boy can take half a dozen of the compact packages under his arm. It used to take his men half an hour to an hour to put up a fixture. Now he finds he can install four or five of these patented fixtures in an hour. The same stock he carries for home installation is used for commerical installations in offices, stores, banks, hotels and public buildings. He finds there is a whole lot of business to be had in replacing and adding to the lighting in business places.

In its appearance the old store has been immensely improved by the proper application of paint and the dressing of displays. Because of the package goods the investment in display has been considerably cut. The goods are now moving all the time. In other words, the dealer has found a way to carry on the lighting fixture business by modern methods.

Getting Free Newspaper Publicity.

Under the title, "The House Electrical," J. E. Nichols, of the Brea Electrical Co., Brea, Cal., had published in a number of newspapers in his vicinity a description of a magnificient country home at Brea which was electrically equipped throughout. Although no mention was made of the company installing the equipment or advocating any particular type, the news value in the article and the local interest created could not help but develop more interest among

the readers in electrical appliances and equipment, in general.

There is a good suggestion here for other contractor-dealers who make interesting installations, the story of which would be of general interest to their communities. If a particularly good or unusual installation of lighting or electrical appliances in a home or other building has been made, and the local newspaper advised of the fact as a news item considerable publicity may be obtained.

Even though the newspaper may object to mentioning the name of the contractor-dealer, or giving him too much free publicity, the educational value of the story cannot but help reflect back to all the electrical merchants in the added interest aroused.

Briefly told, the story which Mr. Nichols gave to the newspapers on the particular installation was as follows, and will give some sort of an idea of what is acceptable to the newspapers.

"A quarter of a century ago, when a man dreamed of what electricity would do in his house, his dream extended little further than ringing bells, incandescent lights, burglar alarms and a few trifles. Could he visit a home here in Brea today, he would find his 'dream' but a tallow candle compared to the reality.

"The home in question is beautiful, architecturally and otherwise, and notably so, in a section that is famous for its beautiful homes, but the part that the owner has made electricity play in his scheme of things is quite wonderful. No doubt, as a boy he read the 'Arabian Nights,' and probably wished that he possessed Aladdin's lamp with its wonderful powers. Today, as a man, he does control a wonderful genie, and with less trouble, for he has only to touch a button. Through its aid his house is lighted, with a soft, diffused light which gives not only comfort but delight to the artistic eye.

"More than that, each hall and room can have that scheme of lighting best suited for its particular purposes. Perhaps, though, the women are more delighted in what this genie does in the kitchen and dining room. It does practically everything, but specifically, there are toasters, percolators, grills, waffle irons, chafing dishes and the like, so clean, so quick, so serviceable, that it makes cooking a pleasure. There are heating pads and appliances to make you comfortable on a chilly day.

"'Blue Monday' is banished from this home, for there are the electrical washing machine and mangle. A touch of the button and what was once a wearisome sewing task becomes a pleasant one, as the sewing machine purrs its tireless little motor, and all this power is controlled by the turn of the button. Then there is the heating of each room electrically, and the heating of water for home use. A stationary vacuum cleaner is located in the basement and each room can be cleaned with slight labor. The owner not only uses this power for pumping water for household purposes, but for irrigation as well. Viewing this home, we can quite understand the owner's enthusiasm for things electrical.

"The electrical home is becoming an institution in California. There is no limit to the use to which electricity can be placed in the household. As soon as a seeming obstacle is reached, inventive ingenuity surmounts it. Today women are cooking, ironing, washing, cleaning and making themselves more beautiful with electricity. Electricity in the home has turned, within the last two years, from a luxury to a necessity. Coal is almost unobtainable, gasolene and fuel oils are soaring in price. Electricity has remained staple. The rates are governed by the State Railroad Commission. People have also learned that electricity has solved their servant problem, and in a hundred and one ways can be put to use in the home. The reason for the popularity of electrical appliances at present is that women are making the discovery that they can completely furnish their homes electrically for the price of the cheapest automobile on the market, and that the service rendered by it is unestimable."

WINDOW DISPLAY WITH FEW PIECES BUT INVITING MESSAGE.

Single-Line or One-Fixture Display Considered Very Effective When Tastily Dressed With Appropriate Setting.

Some dealers are finding it a valuable innovation to vary their general window displays with a simple one-line display and occasionally the display of a single fixture in regal isolation. Such a departure from the usual window full of assorted fixtures is assured marked attention from passersby.

Dealer's Window Display Dressed Simply But Effectively to Show a Single Line of Portables.

The accompanying view of a single-line window display shows a very effective arrangement that is simple and easy to obtain. Several styles of portables are here shown with appropriate background and base, their story simply told by the attractive cards below them. With a variety of back panels, and a simple rearrangement of the articles and fixtures, this display can be made to appear new every week or as frequently as time can be found to change it.

By way of variety a single floor lamp, sewing lamp or other fixture is occasionally being shown by some dealers in even a very large window that is tastefully dressed to impress the observer with its special message. Such a display has been made very effective when used as auxiliary to a campaign on some specialty.

NEW APPLIANCES

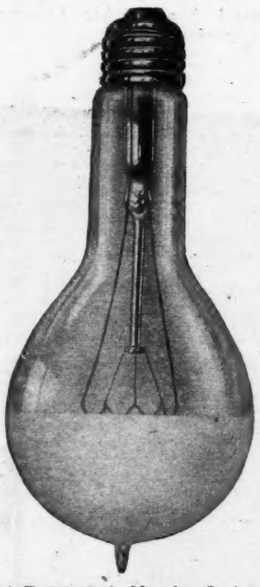
Newly Developed and Improved Electrical and Mechanical Apparatus, Appliances, and Devices Now Being Placed on the Market

Bowl-Enameled Lamps Standardized for Industrial Lighting.

Bowl-enameled Mazda C lamps, which have in the past been listed as special lamps and have been used in industrial installations under various conditions for some time, have been standardized by National Lamp Works of General Electric Co., and may now be regularly handled by its agents. The bowl-enameled lamp is considered an important addition to industrial lighting equipment, especially since it is of greatest service in conjunction with the RLM standard reflector.

The bowl-enameled lamp is a Mazda C lamp with a white enamel superficially applied to the bowl of the bulb. The enamel reflects light toward the base of the lamp and appears from the outside as a soft, white, "eggshell" surface. When lighted a bowl-enameled lamp can be viewed from the tip end at close range without discomfort. The great advantage of this new lamp is that it reduces glare.

According to the manufacturer, the enamel is durable, will not chip off and acid fumes do not affect it. When lamps are burned in the usual tip-down



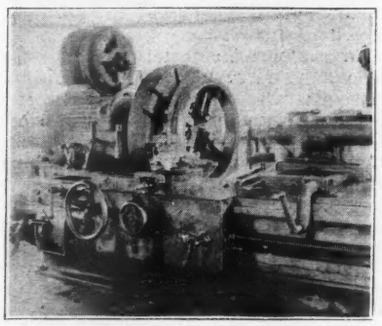
Bowl-Enameled Mazda C Lamp.

position the enamel will not discolor during the life of the lamp. A bowl-enameled lamp can readily be washed in warm water. Because of its smoother surface the new lamp does not collect dirt as readily as a frosted lamp.

Taken alone, the bowl-enameled lamp would not be an unusually important development, but in view of the recent tendency toward standardization in lighting equipment, and because of the fact that this new lamp used with the RLM standard reflector will meet the requirements of the great majority of industrial plants in the country, it is one of the most important developments since the announcement of the Mazda C lamp itself.

Large Capacity Motor-Driven Lathe With One Spindle.

Unusual capacity has been obtained in a one-spindle lathe now being manufactured by the J. J. McCabe Lathe



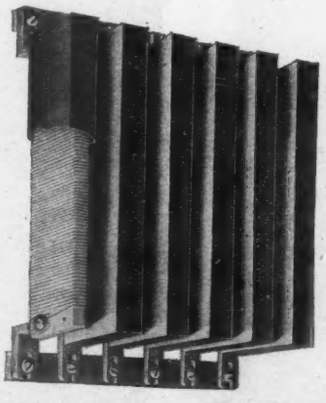
Lathe with Motor-Driven Spindle.

& Machinery Corp., New York City. Work from 24 ins. to 40 ins. in diameter may be machined in this sliding-head drop-rail lathe. As shown in the illustration, the spindle is driven by a 15-hp. 1150-r.p.m. Westinghouse motor mounted directly on the head of the lathe, twelve speeds being possible. These range from 1.6 r.p.m. to 184.2 r.p.m., so as to cover all proper cutting speeds when the constant-speed motor is used. They are obtained by the use of double back-gears located in the lower head-stock casting.

All of the controls for this lathe are located conveniently to the operator

Di-el-ite Resistance Units of Sturdy Construction.

The Wirt Company, Germantown, Philadelphia, has developed a new product in its "Di-el-ite" resistance



Di-el-ite Resistance Unit No. 42-B, Edgewise Type.

unit No. 42-B. It is of the edgewise type and is especially adapted for assembly in banks to occupy a small space. This unit is ironclad, having a sheet-steel case which makes it serviceable for hard work or rough handling. The terminals provide the support and can be made to fit standard fuse blocks. The filling is of ample thickness to give good electrical and mechanical protection to the resistance wire.

The unit is suitable for starting duty or other work where heavy temporary overload must be provided for. The manufacturer claims the unit will radiate six watts per sq. in. of radiating surface in continuous service when exposed to free air circulation, although this rate gives a higher temperature than most engineers care to specify for commercial work; three watts per sq. in. is therefore recommended.

Oscillating Electric Washer with Screened-End Bottom.

On account of a specially designed oscillating tub with a raised screen-end incorporated in the electric-driven washer recently placed upon the market

Electric Washer Gives Surf-Like Action Through Oscillations.

by the Surf Manufacturing Co., Milwaukee, Wis., it is said that a surf-like action of soapy water under and over the clothes is produced at the rate of 72 times a minute. Another feature of this machine is easy interchangeability of standard parts.

The tub is driven by means of a Westinghouse splash-proof motor through gears which assure the positive action of the drive. All of the moving parts are inclosed or protected so that no danger is entailed in operating the machine.

By means of a switch on the frame

of the machine, the electrical energy supplying the motor is controlled, and in addition means are provided for controlling the operation of the tub and the 12-in. swinging ringer. The control handle at the top of the diagonal rod allows the starting, stopping and locking of the tub. The wringer control lever is located at the top of the machine near the wringer. A positive safety release and latch that holds wringer rigid in all positions is also provided. The motor is prevented from burning by means of a safety clutch on the main driving shaft. The entire washer is mounted on roller-bearing casters which makes moving an easy matter.

Automatic Control Panel for Motor-Generator Sets.

In mines and other places where the direct-current supply is obtained from a motor-generator set, it is frequently advantageous to control the power equipment from some remote point, thus eliminating the necessity of an attendant at the switchboard. Several mines are using with their motor-generator sets an automatic control panel, shown in the accompanying illustration, which has all the protective features used in the small modern switchboard and may be controlled from any remote point by means of an ordinary snap switch.

This automatic equipment, manufactured by the Cutler-Hammer Manufacturing Co., Milwaukee, Wis., consists of the necessary circuit-breakers, switches, relays, fuses and instruments mounted on slate panels carried on a floor-type frame. The primary equipment of the control panel shown in the illustration consists of a hand-operated oil circuit-breaker provided with inverse-time-overload attachments, a phase failure and phase reversal relay, and an automatic starter of the auto-transformer type. This is to be used with induction motors, but the same general equipment with a few slight changes can be used with motors of the synchronous type. On the direct-current side a knife switch, voltmeter and ammeter with the necessary fuses, and an automatic reclosing circuit-breaker are provided.

With the remote-control switch "on" the controller may be operated by merely closing the main-line oil circuit-breaker, or the breaker may be left closed and the equipment operated by means of the remote-control switch. The closing of the main circuit-breaker effects the closing of the phase failure and reversal relay, unless one or more of the phases are open or reversed, in which case the abnormal condition must be removed from the line before the relay will close. This relay has also the characteristics of a low-voltage relay, so the equipment will not operate if the line voltage is very low. After the relay closes the automatic starter connects the motor through an oil switch to the low-voltage taps of an auto-transformer. When the equipment has come up to speed the oil switch opens and a second oil switch connects the motor directly to the supply line, at the same time completing a circuit to the closing coil of the automatic reclosing circuit-breaker, which immediately closes, establishing the generator voltage on the direct-current feeders. In case of an overload on the direct-current side, the circuit-breaker opens, and recloses when the overload is removed. The oil switches used on this equipment were described and illustrated in the Dec. 6, 1919, issue of ELECTRICAL REVIEW. They consist of an operating magnet of the clapper type which is mounted on the supporting frame of the switch and drives the switch mechanism by means of a connecting rod extending through the top of the case. Both the stationary and moving contacts of the switch are carried on square insulated shafts and are easily accessible.

New Suspension Hanger for Lighting Units.

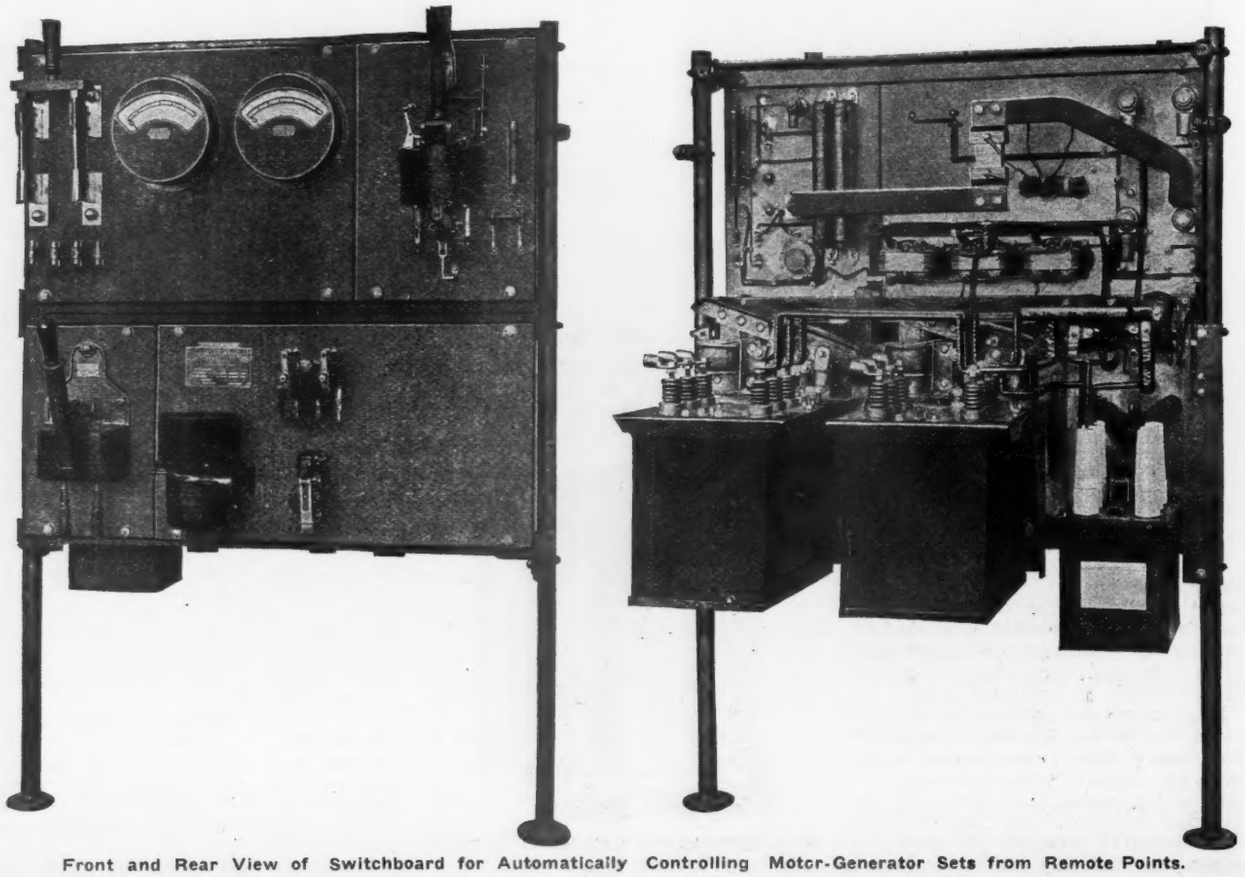
A new "Red Spot" suspension for hanging the Ivanhoe "Trojan" commercial lighting unit has been designed and is being placed on the market by the F. W. Wakefield Brass Co., Vermilion, O. The suspension is made to accommodate "Trojan" units from 75-watt to 400-watt sizes, and in both ceiling and chain suspension types. The canopy is deep enough to accommodate an insulating joint and of diameter sufficient to cover a standard box outlet. The holder is dust tight and bug proof and is of brushed-brass finish.

Two-Point Electric Flatiron.

The Central Flatiron Mfg. Co., Johnson City, N. Y., is offering a new 6-lb., double-point electric flatiron, with two hot points instead of one. This iron is intended to work on both the forward and backward movement thus increasing the working efficiency.

Garage Air Compressor.

An electric air compressor for inflating tires has been developed by the United States Air Compressor Co., of Cleveland, O.



Front and Rear View of Switchboard for Automatically Controlling Motor-Generator Sets from Remote Points.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

McGill Manufacturing Co., Valparaiso, Ind., manufacturer of "Loxon" lamp guards, has issued a new price list and folder on the various types of guards made by the company.

A. A. Wire Co., 50 East 42nd street, New York City, has increased its capital stock from $100,000 to $800,000, to provide for general business expansion.

Pittsburgh Reflector & Illuminating Co., 3117 Penn avenue, Pittsburgh, Pa., has taken bids for the construction of a new 1-story plant, about 70 by 100 ft., to be located at Irwin, Pa.

Luthy Storage Battery Co., 215 Emmet street, Newark, N. J., is making arrangements to rebuild the boiler plant and other portions of its plant, that were destroyed by fire on March 19.

Ohio Insulator Co., Mansfield, O., manufacturer of high-voltage porcelain insulators, is planning for the immediate erection of a 1-story addition, about 40 by 160 ft., to its present plant.

Weber Electric Co., Campbell avenue and Olean street, Schnectady, N. Y., manufacturer of electrical supplies, has had plans prepared for the construction of a new addition to its plant for increased capacity. The structure will be 2-story, brick, about 65 by 100 ft., and is estimated to cost $25,000.

The Wellman-Seaver-Morgan Co., Cleveland, O., moved the manufacturing sales department of the company, which handles the sales of rubber equipment and machinery, from the Akron office to the general offices of the company, 7000 Central avenue, Cleveland. L. N. Ridenour is in charge of the department.

Locke Insulator Corp., Baltimore, Md., has acquired the business, assets and good will of the Locke Insulator Manufacturing Co., of Victor, N. Y., and announce the transfer of the latter company's executive, sales and engineering staff to the Maryland Trust building, Baltimore, Md.

Hopewell Insulation & Manufacturing Co., Hopewell, Va., has been organized by S. S. Sonneborn, 555 Eastern Parkway, Brooklyn, N. Y., and associates and will soon begin the manufacture of molded insulation materials at a plant to be built at Hopewell. The new company has capital stock of $700,000.

Edward Miller Co., Meriden, Conn., manufacturer of lamps, is having plans prepared for the construction of a large new factory building to be located on Center street, for increased capacity. The structure will be 5-story, brick, and mill type, and it is understood that a portion will be utilized for storage purposes.

Electric Storage Battery Co., Philadelphia, Pa., has assembled its branch offices into five districts, North Atlantic, South Atlantic, Lake, Western and Pacific. The Western district office will be in charge of Godfrey H. Atkin, who for 18 years has been

Godfrey H. Atkin.

manager of the Chicago office of the company. Mr. Atkin will have charge of the company's affairs in all departments of the territory from Indiana to the Rocky mountains and from Canada to the Gulf of Mexico, this covering existing salesrooms in Chicago, Minneapolis, Kansas City and Denver. Mr. Atkin has been identified with the electrical industry in Chicago since 1889 when he joined the staff of the Thomson-Houston Electric Co., afterward merged into the General Electric Co. He is a member of the Indian Hill, Mid-Day, Chicago Athletic, Chicago Yacht and Canadian Yacht clubs and last year was vice-commodore of the Chicago Yacht Club. Taliferro Milton succeeds Mr. Atkin as manager of the Chicago office of the Electric Storage Battery Co. Mr. Milton has been connected with the firm for 14 years, having been district engineer in the Chicago office for nine years and assistant manager for the past two years. He is a member of the Western Society of Engineers and the American Institute of Electrical Engineers.

Taliferro Milton.

Luminous Unit Co., division of the St. Louis Brass Manufacturing Co., St. Louis, Mo., has sent to the trade a new price list on Brascolite fixtures in connection with a new catalog that contains all information necessary for dealers and others interested in the products of the company.

National Carbon Co., manufacturer of carbon products, has awarded a contract for the construction of a large new local plant, at Eighth and Brannan streets, San Francisco, Cal., for increased operations. The works will be 1 and 4-story and basement, reinforced concrete type, about 175 by 275 ft., and are estimated to cost approximately $362,500. It is proposed also to erect a new office building at the works to cost about $40,000. Hannah Brothers, 142 Sansome street, San Francisco, are the contractors.

The H-G Manufacturing Co., 1215 Pine street, St. Louis, Mo., recently organized, will manufacture a line of electrical specialties, including fractional horsepower motors for operating motor-driven washing machines, etc. Work will start immediately on the small motors. The officers of the company are J. F. Galvin, president, and A. M. Harrelson, vice-president and treasurer. Mr. Galvin was formerly manager of the St. Louis branch of Robbins & Myers Co., and Mr. Harrelson was chief engineer of the Emerson Electric Manufacturing Co.

Electric Furnace Construction Co., Philadelphia, Pa., announces the following new orders for "Greaves-Etchells" electric furnaces: Wayne Steel & Iron Co., Croghan, N. Y., one 1-ton furnace; Stora Kopparbergs, Berglags Aktiebolast, Domnavet, Sweden, one 20-ton furnace for steel ingots; Socitie Metallurgique de la Loire, St. Etienne, France, two 1-ton furnaces for steel ingots; S. A. C. Electriques de Charleroi, Belgium, one one-half-ton furnace for castings: Carlisle Steel Co., Sheffield, Eng., one one-half-ton furnace for tool steel, and Sproat, Marley Co., Newcastle, Eng., one 1-ton furnace for steel castings. In addition the metallurgical

Group of Western Electric Co. Executives and Sales Managers Who Held Conference at Atlantic City, N. J.

section of the Sheffield University, Sheffield, Eng., has decided to install a one-half-ton "Greaves-Etchells" furnace for experimental work on tool steels and iron melting.

Electric Equipment Co., Davenport, Ia., of which J. S. Kimmel is president, has purchased the building formerly used by the Independent Baking Co. and will use the new location to serve as a wholesale electrical merchandise distribution station. The building is 4 stories high, 145 by 32 ft. Thomas H. Harris, formerly of Indianapolis, Ind., will be the manager of the new store.

Roller-Smith Co., 233 Broadway, New York City, manufacturer of electrical instruments, meters and circuit-breakers, announce the appointment of the American Export & Import Corp., Seattle, Wash., as its agent for the republic of China. The corporation has branch offices in Shanghai, Hong Kong and Hankow, the Shanghai offices being in charge of R. L. Stevens, vice-president, formerly with H. M. Byllesby & Co., Chicago.

Clox-Lite Manufacturing Co., 24 Scott street, Newark, N. J., recently organized for the manufacture of automatic circuit controllers, is planning to increase the capacity of its plant. It is proposed to increase the capitalization of the company to $500,000 to provide for the expansion. Werner O. Olson, formerly assistant chief engineer at the works of Thomas A. Edison, Inc., West Orange, is president, and George L. Hall is secretary and general manager of the company.

Western Electric Co. managers and sales managers of the company's distributing organization of 45 houses and executives from the main offices, 195 Broadway, New York City, held the first general company conference in five years at the Hotel Chalfonte, Atlantic City, N. J., recently, with F. A. Ketcham, general sales manager, acting as presiding officer. The keynote of the conference was "A Larger and More Profitable Business," and it was the consensus of opinion of those present that this result could be attained. Optimism was the prevailing sentiment not only for the growth of the company's business but for the growth of the electrical industry as a whole.

Duluth Electrical Supplies Co., 210 West 1st street, has been organized by A. W. Lindgren and associates, who have acquired the Duluth (Minn.) branch of the Northern Electric Co. Mr. Lindgren was for many years manager of the Duluth branch of the Northern company and is thoroughly familiar with the business and its requirements in his territory. There will be no change in the management, policy or location of the company in connection with the change in ownership, and for the present the company will operate in the same territory as the old company, with a probable extension of territory in the near future.

The Apex Electrical Distributing Co., Cleveland, O., has awarded prizes in the salesmanship contest in which prizes were awarded to wholesale and retail distributors of "Apex" electric suction cleaners. J. H. McKenna, of the Kimball Electric Co., won the first prize for the wholesale section with a total of 1196 points, with F. E. Wartman and G. L. Wilkins, both of the Illinois Electric Co., in second and third place with 998 and 735 points respectively. In the retail section Ralph Reed, of the Illinois Electric Co., stood first with 122 points, with A. R. Raynum, of the same company, second with 82 points. George J. Kerr, of the W. M. Reay & Co., was third with 79 points.

Uehling Instrument Co., 71 Broadway, New York City, combustion engineer and manufacturer of CO$_2$ recording equipment and other fuel economy apparatus, has obtained the services of Charles C. Phelps, formerly with the Ingersoll-Rand Co., manufacturer of power-plant equipment and pneumatic machinery. Mr. Phelps is devoting his time to research work in connection with the efficient combustion of fuel oil in boiler furnaces. He is a graduate of Sevens Institute of Technology and is an associate member of the American Society of Mechanical Engineers.

Westinghouse Electric & Manufacturing Co. can show a striking example of the development of a suggestion as exemplified in the growth of the employes' store opened Oct. 18, 1919, at 709 Braddock avenue, East Pittsburgh, across the street from the works. The store started with a small list of staple groceries, but within a short time it was necessary to enlarge the list of articles, and today a complete line of staple and fancy groceries are handled, beside tobacco and candies. The demand for clothing prompted the employes to enlarge the store, and on the second floor is carried a line of men's, women's and children's shoes in 32 different styles, and in addition men's working blouses, shirts and trousers are handled.

Tailoring Department and Samples of Shoes on Sale at Westinghouse Employes' Store.

A Well-Arranged Grocery Department at Westinghouse Employes' Store.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

HERBERT G. TULLEY, Buffalo, N. Y., was elected president of the International Railway Co. at a recent meeting of the board of directors.

C. H. HARDESTY, Fairmont, W. Va., has been appointed general superintendent of the Monongahela Valley Traction Co., to succeed W. V. NEAL, recently resigned.

F. A. CHAMBERLAIN, general manager of the Richland Public Service Co., of Mansfield, O., has been elected secretary of the recently organized Mansfield Rotary Club.

GEORGE N. ROOKER, manager of the Richmond (Cal.) division of the Western States Gas & Electric Co., has been elected a director of the Rotary Club recently organized in Richmond.

E. W. PETTY, electrical engineer of Armour & Co., Chicago, Ill., has just completed the major portion of the electrical design and erection of the new $10,000,000 Armour packing plant in St. Paul, Minn.

HAROLD ALMERT, a member of the board of directors of the American Association of Engineers, is delivering a series of lectures on engineering to the Junior Association of Commerce of the city of Chicago, Ill.

W. C. LOUNSBURY, re-elected president of the Wisconsin Electrical Association at the annual convention recently held in Milwaukee, is general manager of the Superior Water, Light

W. C. Lounsbury.

& Power Co., Superior, Wis., and is well-known in the electrical industry, not only in Wisconsin, but throughout the United States. Mr. Lounsbury is a member of the executive committee of the National Electric Light Association.

O. P. GOTHLIN, chief of the traffic bureau of the Indiana Public Service Commission, retired from that position on April 1. He was formerly chairman of the Ohio Public Utility Commission. A. B. CRONK, an attorney and rate expert, succeeds Mr. Gothlin.

WILLIAM H. BROWN, manager of the Red River Power Co., Grand Forks, N. D., has been appointed chairman of a committee to solicit funds for the purchase of a site which the city of Grand Forks will furnish for a mill and elevator to be erected by the North Dakota Industrial Commission.

DR. CARL D. HOCKER, connected with the Western Electric Co., gave an interesting address on chemical problems in the telephone industry at the regular monthly meeting and dinner of the New Jersey Chemical Society, held on Monday, March 8, at Achtel-Stetter's, Newark, N. J.

W. H. SMAW, purchasing agent of the Georgia Railway & Power Co, has resigned to accept a position as southern sales representative of the Electric Service Co., of Philadelphia. Mr. Smaw joined the Georgia Railway & Power organization in 1903 and has been purchasing agent since 1910.

JOHN N. CARLISLE, who is well known to many electrical contractors in New York state through his position with the New York State Public Service Commission and Department of Highways, has been engaged by the Albany (N. Y.) Chamber of Commerce to promote industrial development around Albany.

E. A. OLDERSHAW is now in charge of the waterproofing department of the Mitchell-Rand Manufacturing Co., New York City, manufacturers of electrical insulating specialties, as manager of sales. Mr. Oldershaw has been connected with this line of business for about 15 years, and is well known in the trade.

E. E. HEDLER has been appointed eastern representative of the Buckeye Electric Division, National Lamp Works, of Cleveland, O., with headquarters in Philadelphia. Mr. Hedler is well known in electrical circles in the east, having been associated with the Western Electric Co. and the Electric Service & Supply Co.

L. M. CLARK, for the past eight years traffic engineer of the Chesapeake & Potomac Telephone Co., at Baltimore, Md., has taken a position in the traffic department of the New York Telephone Co. in New York City. He is succeeded at Baltimore by C. B. WEST, former division traffic supervisor for the Chesapeake & Potomac Telephone Co., in Washington, D. C.

T. J. PACE, formerly industrial assistant to manager of the supply department, has recently been appointed assistant manager of the supply department of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Mr. Pace has been actively identified with the electrical industry along sup-

T. J. Pace.

ply lines with Westinghouse and allied interests for about 20 years. A portion of this time was devoted to commercial and engineering work in lighting applications. In this work he has been prominently connected with a number of the larger of the present-day street lighting installations, and has presented a number of papers before the various engineering organizations on this and other subjects. He has been a leading advocate of standardization within the industry. More recently, Mr. Pace has devoted a large part of his time to industrial applications of electricity, and in popularizing the use of electrical devices, including safety electrical appliances, in industrial plants. Mr. Pace is an active member of many of the engineering and trade organizations in the electrical industry.

OBITUARY.

GEORGE E. FISHER, professor of mathematics at the University of Pennsylvania, died at Atlantic City, N. J., on March 29. He was 57 years of age.

BUTLER MAILLARD WILSON, for many years connected with the auditing department of the New York Telephone Co., died in New York City on March 19.

THOMAS F. CLARKE, who gave up his vice-presidency of the Western Union Telegraph Co. in 1914, after a tenure of 15 years and a record of 40 years of service with the company, died recently in Colombo, Ceylon, according to word just received in this country.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Springfield, Mass.—Gilbert & Barker Manufacturing Co., manufacturer of oil burning systems, pumping equipment, etc., has awarded contract to Tucker & Lewis, 101 Park avenue, New York City, for the construction of the proposed new additions to its plant estimated to cost approximately $1,000,000. The work includes the erection of boiler plant, 1-story, 52 by 92 ft.; 1-story engine building, 41 by 72 ft.; 2-story addition to sheet metal department; 2-story foundry; new testing building; stone sand blast building; 3-story administration building, and auxiliary structures.

Pawtucket, R. I.—Fales & Jenks Machine Co., Pine and Dexter streets, has awarded a contract for the erection of a new 2-story brick engine plant at its works, about 25 by 25 ft.

Westerly, R. I.—Westerly Automatic Telephone Co. has increased its capital from $200,000 to $400,000, for expansion.

Hartford, Conn.—Bryant & Chapman have completed plans for the construction of the proposed new power plant addition to their works, to be located at Woodland and Chapman streets.

Stamford, Conn.—Duane Sugar Refining Co. has awarded a contract to Dooling & Kenlon, 7 South 3rd avenue, Mt. Vernon, N. Y., for the construction of a new addition to the power plant at its local refinery, for increased power facilities. The structure, with equipment, is estimated to cost about $200,000.

Buffalo, N. Y.—Considerable electrical machinery, refrigerating apparatus, etc., will be required in connection with the construction of the proposed new 2-story brick and reinforced concrete ice cream manufacturing plant of the Spark Dairy, Hudson and Niagara streets. The structure will be about 66 by 106 ft., and is estimated to cost $50,000; it will be located at 146 Prospect avenue.

New York, N. Y.—A. H. Wolff Gas Radiator Co., 4 Great Jones street, has increased its capital from $20,000 to $50,000 to provide for general business expansion.

New York, N. Y.—Auomatic Switch Co. has completed negotiations for the leasing of property at 154 Grand street for a new establishment.

New York, N. Y.—New York Telephone Co., 15 Dey street, has awarded a contract to the Valentine Lynch Co., 13 Park Row, for alterations and improvements in its telephone exchange plant at 30 Gold street, to facilitate operations. The work is estimated to cost about $15,000. The company is having preliminary plans prepared for the construction of the proposed new 6-story exchange plant at 121 West 73rd street, about 80 by 192 ft., estimated to cost $1,200,000. McKenzie, Voorhees & Gmelin, 1123 Broadway, are the architects.

New York, N. Y.—American Telephone & Telegraph Co. has filed notice with the Secretary of State of an increase in its capitalization from $500,000,000 to $750,000,000.

New York, N. Y.—New York Edison Co., Irving place and 15th street, has been awarded a contract for furnishing electrical energy for all features of operation for the new 16-story structure to be erected by the Armion Realty Corp. at 469 7th avenue. The building will be equipped for light manufacturing, and electrical energy for 7,000 lamps and 340 hp. will be furnished. The company is also furnishing service for 3,000 lamps and 125 hp. to the Hotel Woodward, Broadway, at 55th street.

New York, N. Y.—Ruby Boiler Co. has completed negotiations for the leasing of property at 330 West 42nd street, for a local establishment.

Niagara Falls, N. Y.—Niagara Falls Power Co. has filed notice with the Secretary of State of an increase in its capitalization from $26,000,000 to $26,545,400, to provide for general business expansion.

Port Chester, N. Y.—P. R. Mallory & Co., manufacturers of tungsten products, has leased property at 24 West 39th street, New York City, for a local establishment.

Troy, N. Y.—It is reported that Henry Ford will use Green Island, in the Hudson river, near Troy, for the manufacture of self-propelling electric street cars.

Freehold, N. J.—The State Board of Public Utility Commissioners has ordered the Standard Gas Co. to make improvements in its plant, for increased service. The proposed work includes the installation of new boiler equipment in its Atlantic Highlands plant.

Hightstown, N. J.—Plans are under consideration by the town council for the purchase of the plant of the Hightstown Electric Light & Power Co. Improvements in the municipal waterworks plant are also planned.

Jersey City, N. J.—The City Commission has had plans prepared for the construction of a new power plant at the City Hospital. The structure, with mechanical equipment, is estimated to cost about $50,000. F. A. Dolan is the city clerk.

Newark, N. J.—The City Council is considering plans for extensions and improvements in the electric street-lighting system in Broad street. It is proposed to restore lights to a pre-war basis. The Broad Street Improvement Association is interested in the work.

Pequannock, N. J.—The township committee is understood to be considering plans for the installation of a new electric street-lighting system in the Riverdale district.

South River, N. J.—The Board of Public Works is taking bids, to close April 12, for the construction of the proposed new 1-story brick power plant, about 59 by 78 ft., to be used for municipal service. The structure, with equipment, is estimated to cost about $125,000. Goss, Bryce & Johnson, 55 Liberty street, New York City, are the engineers on the project.

Toms River, N. J.—Ocean County Electric Co. has completed arrangements for the immediate construction of its proposed local hydroelectric plant. The company's plans include the construction of a concrete dam 500 feet wide, as well as the erection of power houses and pumping stations, to develop a capacity of about 2500 hp. The project is estimated to cost close to $500,000. Edmund S. Fritz, Philadelphia, is president of the company.

Trenton, N. J.—Tri-County Electric Co. has filed notice with the Secretary of State of an increase in its capitalization from $25,000 to $125,000, for general business expansion.

Trenton, N. J.—The City Commission is considering immediate arrangements for the installation of new fuel economizing apparatus at the municipal pumping plant for smoke elimination. The work is estimated to cost about $10,000.

Trenton, N. J.—Large quantities of electrical and mechanical equipment will be required in connection with the establishment of the new local plant of the Pocono Rubber Cloth Co. The company recently took over the property of the Howard Demountable Rim Co., 1851 East State street, for its new plant. Plans have also been prepared for the construction of a power plant for general factory service.

Allentown, Pa.—Plans are under consideration by the city council for extensions and improvements in the electric street-lighting system in the Fifteenth ward district.

Bethel, Pa.—A total of eight electric companies operating in Lebanon and Berks counties have effected a merger, the new company to be known as the Blue Mountain Electric Co., with an initial capital of $50,000. These companies are: Blue Mountain, Bunker Hill, Marion, Union Township, and Bethel Township Electric companies, all of Lebanon county; and the Mt. Aetna, Upper Tulpehocken, and Upper Bern Electric com-

panies, of Berks county. Harvey C. Stambaugh of Rehrersburg, is president of the new organization.

Bethlehem, Pa.—Plans have been completed by the Bethlehem Steel Co. for the erection of a new 1-story electric shop, about 24 by 52 ft., for one of its billet mills. The structure will cost about $10,000.

Marcus Hook, Pa.—Congoleum Co., manufacturer of floor coverings, is planning for the installation of new boiler equipment at its plant for increased power facilities.

Philadelphia, Pa.—Notaseme Hosiery Co., Oxford and Mascher streets, has awarded a contract to the Turner Construction Co., 1713 Sansom street, for the erection of a new 2-story concrete boiler plant, about 48 by 107 ft., to be located at Venango and 1 streets. The structure, with equipment, is estimated to cost $50,000.

Philadelphia, Pa.—Abrasive Co., James and Fraley streets, has had plans prepared for the construction of a new power plant at its works, for increased operations. L. T. Byers is general manager of the company.

Philadelphia, Pa.—The City Bureau of Water has awarded a contract to Charles H. Dading, Bellevue Court building, for the erection of a new 1-story brick pumping station at the city waterworks plant at Lardner's Point. The structure will be about 61 by 78 ft., and with equipment is estimated to cost $43,000.

Pottsville, Pa.—The Eastern Pennsylvania Light, Heat & Power Co. has just completed a contract for a tie-in with the lines of the Metropolitan Edison Co., of Reading, Pa., that will necessitate the erection of a three-phase, 60 cycle, 23,000-volt transmission line, 16-mi. long. The line conductors will be No. 1 solid copper wire and 45,000-volt insulators will be used, so that at a later date the line can be changed for 38,000-volt operation. The company will also put into service three additional 667-kv-a. transformers in the Tamaqua substation and two switchboards will undergo a complete re-arrangement and overhauling to facilitate switching and permit segregation of distribution system troubles. Recently the company installed a 1250-kv-a. synchronous condenser and another of the same type has been purchased and will soon be installed at the Frackville substation.

Dover, Del.—Bills have been introduced in the State Legislature authorizing the issuance of bonds for the improvements and enlargements of electric plants in two municipalities. These are: $75,000 for extensions and improvements in the electric light and waterworks plant at Newark; and $10,000 for the completion of improvements at the electric light and water plant at Smyrna.

Cecilton, Md.—The town council is considering plans for the immediate rebuilding of the municipal electric plant, recently destroyed by fire.

Greensboro, Md.—Large quantities of electrical and mechanical equipment will be required in connection with the construction of the proposed new local plant of the Helvetia Milk Condensing Co., of Highland, Ill. The new works will comprise main manufacturing building, about 176 by 279 ft., 1 and 2-story, to have a capacity of approximately 200,000 lbs. of milk daily; a complete refrigerating plant will be operated at the works, and the plans include the construction of a large power plant for general factory service. Machinery and equipment throughout the works will be electrically operated wherever possible.

Hagerstown, Md.—Hagerstown & Frederick Railway Co. has had plans prepared for the construction of a new 33,000-volt high-tension line to extend from Martinsburg, W. Va., to Winchester, Va., a distance of about 22 miles. The company is also planning for the installation of a new steam turbine unit and boiler equipment at its Millville, W. Va., plant. as well as for the construction of a new 33,000-volt transmission system to Braddock Heights, Md., about 20 miles. M. A. Pooler is general manager of the company.

Washington, D. C.—Potomac Electric Power Co. has arranged for the organization of a company to engage in the sale of electrical fixtures and appliances, heretofore taken care of by the Potomac company. The new organization will be located at 607 14th street, and will be known as the Potomac Electric Appliance Co. It is interesting to note that this feature of the business has grown from about $15,000 for sales in 1915 to $250,000 in 1919.

Charlottesville, Va.—The common council has approved an appropriation of $200,000 for improvements in the city waterworks plant, as well as $35,000 for equipment for the municipal gas plant.

Fredericksburg, Va. — Northern Neck Railway & Power Co., recently incorporated with a capital of $5,000,000, is planning for the construction and operation of an electric railway system from Fredericksburg to a point on the lower Rappahannock river, about 100 miles in length. Willis H. Fowel is president; C. D. Happer, vice-president; and M. Glennon, secretary, of the company.

Fredericksburg, Va. — Rappahannock Electric Light & Power Co. has awarded a contract to the Fredericksburg Power Equipment Co., Fredericksburg, for the construction of a new addition to its plant, about 40 by 120 ft., estimated to cost about $35,000. E. C. L. Ficklen is secretary and treasurer of the company.

St. Marys, W. Va.—Fire on March 30 destroyed the pumping plant at the J. B. Reynolds property, with loss estimated at about $10,000.

Chesterfield, S. C.—Teal Light & Power Co. is understood to be considering plans for the installation of new generating equipment at its plant for increased operations. D. T. Teal is the manager of the company.

Columbia, S. C.—Home Light & Power Co. has awarded a contract to J. T. Dabbs, Columbia, for the erection of an addition to its plant, to cost about $40,000.

Georgetown, S. C.—The city is considering plans for the purchase of the local electric light and power plant. Bonds for $50,000 have been voted, the proceeds to be used for this purpose.

Sumter, S. C.—Plans are being arranged by the city for the construction of new municipal electric light, power and ice manufacturing plants. The project is estimated to cost in excess of $250,000.

Pearson, Ga.—The city has voted $30,000 in bonds for the purpose of installing a lighting and waterworks system.

Apalachicola, Fla.—The city expects, with the next six months, to erect an electric lighting plant. J. J. Warren is city cashier.

Bronson, Fla.—The Bronson Manufacturing Co. is considering the establishment of an electric light plant for the purpose of supplying electrical service to the town. I. P. Kimble is manager of the company.

NORTH CENTRAL STATES

Dayton, O.—Specifications for the new plan of lighting the city streets will be completed by Service Director Martin in a few days. Bids will be received about the middle of April.

Warren, O.—The Trumbull Public Service Co., allied with the H. L. Doherty properties, will treble the capacity of its main producing plant by 1924, increasing it from 70,000,000 kw.hr. in 1919 to 229,000,000 kw.-hr. in 1924.

Youngstown, O.—To furnish power for industrial centers in eastern Ohio, the H. L. Doherty interests are planning a large power plant on the Ohio river, near Wheeling or Steubenville. Tentative plans call for an investment of $25,000,000.

Indianapolis, Ind.—Craig-Hunt Motors Co. will build an automobile assembly factory and service station to cost $50,000.

Ladoga, Ind.—The Ladoga Electric Light Co. has sold its plant to the Roachdale Electric Light Co., the Roachdale plant, giving 24-hr. servsupply light and power from its Roachdale plant, giving 24 hr. service over a line to be erected between the two towns. Possession will be given June 1.

Macy, Ind.—The Fulton Telephone Co. has increased its capital stock from $5,000 to $15,000.

Muncie, Ind.—The city council is considering an ordinance to employ an engineer to inspect the municipal electric light plant in connection with a proposed $200,000 bond issue for additional equipment. Further information can be obtained from Bryam Robbins, city attorney.

Terre Haute, Ind.—The Power Supply Co. has increased its capital stock from $120,000 to $180,000.

Danville, Ill.—City Engineer H. O. Edwards is preparing plans for a lighting system on the city boulevards.

Litchfield, Ill.—The Litchfield Coal Mining Co. has placed an order for an electric mining machine which will cut about 250 tons of coal a day. The company expects to have this machine installed in about 60 days and

the mine fully equipped in about 90 days.

Marion, Ill.—The city is planning an improvement in street-lighting effects in the business section. Lighting posts will be installed and assessed against the property holders, the city to pay for the electrical energy used. The total cost of installing the system has been estimated at over $54,000.

Moline, Ill.—The Strombeck and Becker Manufacturing Co. has increased its capital stock from $25,000 to $75,000. J. F. Strombeck is president and D. D. Becker, secretary, of the company.

Peoria, Ill.—Staley Manufacturing Co., of Decatur, Ill., will erect a $500,000 plant in Peoria. The company has in contemplation an investment in Peoria which will total more than $5,000,000. Only the first unit of the plant will be built now.

Sherrard, Ill.—The Sherrard Electric Light Co. has filed a petition with the Illinois Public Utilities Commission for authority to extend an electric transmission line to Reynolds, Ill., and to sell electrical energy to the Reynolds Light and Power Co.

Springfield, Ill.—Plans and specifications for improvements covered by a $400,000 bond issue have been voted upon favorably by the citizens and approved by the City Council. The plans provide for extensive improvements in the city electric lighting plant. An injunction suit restraining the city from selling the bonds is now pending in the courts.

Bay City, Mich.—The Bay City Foundry and Machine Co. plant was destroyed by fire, the loss being estimated between $65,000 and $70,000.

Butternut, Wis.—W. J. Schulz will rebuild his electric light plant and install power machinery capable of developing 150 hp.

Orfordville, Wis.—The Orfordville Light & Power Co. has received word that the Southern Wisconsin Power Co. expects to commence the erection of a high-tension line from Jonesville to Ortonville. This will enable the Orfordville company to purchase electrical energy from the Wisconsin company instead of maintaining their own plant.

Sheboygan, Wis.—The Sheboygan Cigar Box and Manufacturing Co will electrify its plant.

Whitefish Bay, Wis.—A. J. Sweet, engineer, Palace Theater building, Milwaukee, Wis., has prepared plans for a municipal lighting system at Whitefish Bay.

Des Moines, Ia.—The Des Moines Electric Co. will expend over $1,000,000 for new equipment in order to increase the facilities of its plant 50%. A contract has been closed for a 10,000-kw. turbine, which will increase the capacity of the plant to 30,000 kw.

Letts, Ia.—Citizens of this community are making arrangements to connect this town with a high-power electric transmission line. A small bond issue will doubtless be floated to provide the necessary funds for the rebuilding of the lines now in use and to buy the present lines now on the streets.

Mount Ayr, Ia.—The city electric light plant was recently destroyed by fire at a loss of $35,000.

Caplinger Mills, Mo.—W. A. Whinery, Humansville, Mo., is planning improvement to a dam, for increasing the generating capacity, that supplies electrical energy to Stockton and Eldorado Springs.

Carthage, Mo.—The city has voted $100,000 in bonds for the purpose of improving the electric light and water system.

St. Joseph, Mo.—Automatic Car Brake Co., a Delaware incorporation, has increased its capital from $100,000 to $2,000,000.

Holbrook, Neb.—The town will hold a special election to vote on the question of enlarging the electric light plant. Address town clerk for further information.

Lincoln, Neb.—The municipal electric light and water department will erect a new plant. P. W. Doerr is superintendent of the plant.

SOUTH CENTRAL STATES.

Hazard, Ky.—Notice has been filed with the Secretary of State by the Hazard Light & Power Co. of an increase in its capital from $50,000 to $200,000, to provide for extensions and improvements to its plant and system.

Carthage, Tenn.—Smith County Electric Co. is considering plans for the construction of a new transmission line to Monoville, Riddleton and Dixon Springs, a distance of about 11 miles. R. S. Seese is the manager of the company.

Centerville, Tenn.—An election will be held April 17 for the purpose of voting bonds to equip the electric lighting plant, now in course of construction.

Natchitoches, Ia.—Natchitoches Light & Waterworks Co. is planning for improvements and extensions to its plant and system, estimated to cost about $88,000. Contract for the work has been awarded to Spencer & Hinkley, Shreveport, La.

Picron, Ark.—Arkansas Light & Power Co. is arranging plans for extensive improvements and extensions in its transmission system. It is proposed to construct a new 33,000-volt line from England to Stuttgart, about 24 miles, at an estimated cost of $80,000; as well as new distribution lines aggregating about 130 miles in the Stuttgart and Lonoke fields.

Prague, Okla.—The city is contemplating the erection of a 33,000-volt transmission line to be connected with the electric light and water plant.

WESTERN STATES.

Laurel, Mont.—The city council has been petitioned to improve the street lighting in the business district at an estimated cost of $5,000.

Whitefish, Mont.—The "white way" lighting system, served by the Mountain States Power Co., will be enlarged by the construction of 36 new ornamental standards.

Phoenix, Ariz.—Louis Melczer, H. W. Hellman building, Los Angeles, Cal., and associates are organizing a new company for the furnishing and distribution of electrical energy to the Casa Grande district as well as the operation of pumps to irrigate a total of about 120,000 acres of property. It is understood that the first unit of the plant will be located at Casa Grande and will have a capacity of about 5000 hp.

INCORPORATIONS.

Terre Haute, Ind.—The Miller Electric Co. has been incorporated with capital stock of $10,000 by Frank Miller, E. Wissel, E. C. Kadel and Albert F. Fischer.

Indianapolis, Ind.—The Riddell Worm-Drive Switchstand Co. has been incorporated with capital stock of $50,000 by Sherrord Riddell, Frank Heath and J. J. Graham.

New York, N. Y.—Acme Phonograph Motors Corp. Capital, $100,000. To manufacture motors for phonographs, etc. Incorporators: C. P. Evans, F. H. Hedinger and M. Samuels, 6 East 16th street.

New York, N. Y.—International Automatic Appliance Corp. Active capital, $5,000. To manufacture electrical equipment. Incorporators: G. Gebhard, G. Levitus and G. H. Olney, 120 Broadway.

Trenton, N. J.—Jackson Electric Motor Repairing Co. Capital, $10,000. To operate a local motor repair works. Incorporators: C. M. McDermott, William J. Jackson and James J. McCoogan.

PROPOSALS.

Electrical Equipment—Bids will be received April 29 by the Sanitary District, room 710, 910 South Michigan avenue, Chicago, Ill., for furnishing, delivering and installing electrical equipment, switchboard, conduit and wiring at the Desplaines river sewage treatment works.

Electrical Equipment—Bids will be received April 19 for a drainage pumping outfit consisting of new concrete block building, pumping outfit for one 75-hp. electric motor, one 21-in. centrifugal pump and all necessary transformers, switchboards, switches, belting, lights, suction and discharge pipes, sump pit and screen, all complete and ready to operate. Bids will be received by the Commissioners of the Kerton Valley Drainage and Levee District in the county of Fulton, Ill. For further information address, Ted Heffren, commissioner. Lewiston, Ill.

Ornamental Street Lighting System—Bids will be received by O. F. Svanberg, city clerk of Sheridan, Wyo., on April 19, for furnishing all labor, tools, materials and appliances for the installation of an ornamental street-lighting system complete, including ornamental posts, glassware, extension capitals, cables, regulators, control panels and all other accessories.

Electric Lighting System—The city of Valparaiso, Chile, will open bids on June 15, 1920, for the building of a central electric lighting and distribution system.

By-Products of Institutional Advertising

During the war certain manufacturers were exchanging notes with regard to the freight congestion. One in particular surprised the group by telling them that he had experienced practically no trouble whatever. His was one of the smaller houses, but a house that each year made a very considerable investment in advertising. Inquiry developed the fact that the prestige which his advertising had created in the minds of the men handling freight had created also the impression that if any goods were to pass through the gateways his must be got through by all means! Advertising, without deliberate intent, had created with these handlers of freight the impression that this smaller house was pre-eminent!

The results of good advertising are not always to be found on the sales sheets—or in the minds and hearts of the buying public. Very often, says Printers' Ink, these are supplemental benefits that have been accruing to a business for years and years, awaiting a crisis to make themselves known.

Prestige with the bankers, built up through advertising, has tided many a commercial craft through perilous seas, at a time when its balance sheet alone would never have brought it to harbor. One of the most successful advertisers today, for many years in financial difficulties, had faith that advertising could create such a demand for his raw material that he could convert it from collateral into cash, pay off the liabilities that it covered, and go ahead in a business venture that would eventually make him a fortune. He prevailed upon his bankers to back him sufficiently to give it a trial. His first returns in orders and smashing good leads he put up as "collateral" to justify additional advertising. To-day his product, in its various forms, represents practically a new economic good, his market is international—and his annual advertising campaign runs into six figures.

The employment manager of a big industrial plant in a Middle Western city testifies that of two concerns in the same business, one, the largest national advertiser in its field, attracts a class of labor of evident superiority to the class attracted by its largest competitor, a concern even greater in size but extremely conservative in its use of advertising space in national mediums. The experience of this manager qualifies him to give accurate testimony. He says that the better, brighter workmen prefer to work with the company that carries its story to the people in a big and impressive way. It is their guarantee that the company is going ahead, that its profits will be larger and larger—and that a greater and greater share of this increased revenue will come back to the workmen as increased earnings.

Not all that advertising accomplishes is always included among the "Things that Advertising Does!"

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Western Union Telegraph Co. Shows Gain in Surplus.

The annual report of the Western Union Telegraph Co., for the year ended Dec. 31, 1919, shows a surplus for the year of $34,715,470, against $32,518,993 in 1918, a gain of $2,196,477. During the year dividends paid and declared amounted to $6,982,472, while retroactive compensation paid to employes for the year 1918 amounted to $985,387. The balance sheet total for the year was $229,604,535, over $171,000,000 of this amount being in the property account.

Western States Gas & Electric Co. Issues $603,000 Preferred Stock.

The Western States Gas & Electric Co., which maintains headquarters at Stockton, Cal., has been authorized by the California Railroad Commission to issue an additional amount of $603,000 par value preferred stock. The stock is being absorbed rapidly by the company's customers and the local public. It is expected that the proceeds will take care of the company's construction and sinking fund requirements for 1920.

Montana Power Co.

The Montana Power Co. reports for the year ended Dec. 31, 1919, a surplus after charges and federal taxes of $2,167,055, equivalent, after preferred stock dividends, to $3.43 a share on $43,407,500 dividend-bearing common stock, compared with $3,050,195, or $5.87 a share, on $40,407,500 dividend-bearing common stock in 1918.

Dayton Power & Light Co.

Annual report of the Dayton Power & Light Co. for the year ended Dec. 31, 1919, shows net surplus after all charges and taxes of $433,209, equivalent after deduction of preferred dividends to $7.85 a share ($100 par value) earned on the $3,053,000 common stock, as compared with net surplus of $301,916, or $4 a share earned on the common stock in 1918.

Texas Power & Light Co.

Earnings of the Texas Power & Light Co. for December and 12 months ended Dec. 31, 1919, compare with 1918 as follows:

	1919.	1918.
December gross	$ 371,158	$ 345,813
Net after taxes	173,243	137,340
Total income	173,795	138,161
12 months' gross	3,482,417	3,248,180
Net after taxes	1,171,928	1,076,088
Total income	1,179,688	1,077,949
Bal. after pfd. divs.	268,490	176,234

American Power & Light Co.

Earnings of the properties of subsidiary companies operated by the American Power & Light Co. for December and the 12 months ended Dec. 31, 1919, compare with 1918 as follows:

	1920.	1919.
December gross	$1,706,313	$1,392,292
Net earnings	731,748	545,354
12 months' gross	16,307,363	13,700,647
Net earnings	6,161,946	5,244,669

Helena Light & Railway Co.

Earnings of the Helena Light & Railway Co. for January and the 12 months ended Jan. 31, 1920, compare with 1919 as follows:

	1920.	1919.
January gross	$ 34,275	$ 32,837
Net after taxes	9,665	9,717
12 months' gross	356,035	318,372
Net after taxes	71,296	51,415

Western States Gas & Electric Co.

The gross and net earnings of the Western States Gas & Electric Co. (of Delaware) and subsidiaries are reported as follows for the month of February and the 12 months ended Feb. 29, 1920, compared with the corresponding periods last year:

Month of February:	1920	1919.
Gross earnings	$ 187,748	$ 153,391
Net earnings	85,958	72,021
12 months ended Feb. 29:		
Gross earnings	1,960,735	1,674,521
Net earnings	799,730	667,865

Consolidated Gas, Electric Light & Power Co. of Baltimore.

Annual report of the Consolidated Gas, Electric Light & Power Co. of Baltimore for the year ended Dec. 31, 1919, shows surplus after charges, depreciation and taxes of $1,198,089, equivalent to $8.20 a share ($100 par value) earned on the $14,607,300 capital stock, as compared with surplus of $1,157,565, or $8.04 a share earned on the $14,385,800 capital stock, for the year ended June 30, 1918. Income account of the company for the year ended Dec. 31, 1919, compares as follows:

	Year ended Dec. 31, '19.	Year ended Jan. 30, '18.	Year ended Jan. 30, '17.	Year ended Jan. 30, '16.
Gross income	$12,813,617	$10,619,588	$8,498,809	$7,431,769
Expenses and taxes	8,012,906	6,415,684	4,480,165	3,848,076
Charges	2,283,622	2,071,339	1,672,223	1,580,058
Net income	$ 2,517,089	$ 2,132,565	$2,346,421	$2,003,635
Depreciation	925,000	725,000	600,000	550,000
Conting. res.	394,000	250,000	300,000	134,542
Bond disc	.....	.....	.....	90,000
Balance	$ 1,198,089	$ 1,157,585	$1,446,421	$1,229,093
Dividends	1,162,026	1,150,864	1,305,746	1,131,804
Surplus	$ 36,063	$ 6,701	$ 140,675	$ 97,289

Consumers Power Co.

Combined earnings of the Consumers Power Co. and the Michigan Light Co. for February and the 12 months ended Feb. 29, 1920, compare with 1919 as follows:

	1920.	1919.
February gross	$1,140,560	$ 914,808
Net earnings	433,713	415,677
Surp. after fixed chgs.	204,903	198,468
Bal. after pfd. divs.	140,474	134,451
12 months' gross	11,900,344	9,852,181
Net earnings	5,151,662	4,354,838
Surp. after fixed chgs.	2,614,601	1,941,043
Bal. after pfd. divs.	1,843,172	1,174,021

Southern California Edison Co.

The Southern California Edison Co. reports for the year ended Dec. 31 last, which compares:

	1919.	1918.
Gross	$10,569,564	$8,735,457
Operating expenses	4,480,321	3,348,423
Net	6,089,243	5,387,034
Int. and amortization	3,106,060	2,943,568
Balance	2,983,182	2,443,465
Depreciation	1,000,000	500,000
Net before fed. taxes	1,983,182	1,943,465

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Mar. 30.	Bid Apr. 6.
Adirondack Electric Power of Glens Falls, common	6	11	8
Adirondack Electric Power of Glens Falls, preferred	6	77	74
American Gas & Electric of New York, common	10+extra	126	124
American Gas & Electric of New York, preferred	6	38½	37
American Light & Traction of New York, common	..	187	186
American Light & Traction of New York, preferred	6	89	88
American Power & Light of New York, common	4	65	63
American Power & Light of New York, preferred	6	67	70
American Public Utilities of Grand Rapids, common	..	5	4
American Public Utilities of Grand Rapids, preferred	7	16	16
American Telephone & Telegraph of New York	..	102	104
American Water Works & Elec. of New York, common	..	4	3
American Water Works & Elec. of New York, particip	7	8	7
American Water Works & Elec. of New York, first preferred	..	45	45
Appalachian Power, common	..	3	2
Appalachian Power, preferred	7	20	17
Cities Service of New York, common	+extra	388	390
Cities Service of New York, preferred	6	70	69
Commonwealth Edison of Chicago	8	105	106
Comm. Power, Railway & Light of Jackson, common	..	18	22
Comm. Power, Railway & Light of Jackson, preferred	6	42	49
Federal Light & Traction of New York, common	..	6	6
Federal Light & Traction of New York, preferred	..	45	44
Middle West Utilities of Chicago, common	..	18	19
Middle West Utilities of Chicago, preferred	..	39	40
Northern States Power of Chicago, common	..	50	49
Northern States Power of Chicago, preferred	ex.div.7	87	86
Pacific Gas & Electric of San Francisco, common	..	49	50
Public Service of Northern Illinois, Chicago, common	7	78	78
Public Service of Northern Illinois, Chicago, preferred	6	83	83
Republic Railway & Light of Youngstown, common	4	17	18
Republic Railway & Light of Youngstown, preferred	6	54	54
Standard Gas & Electric of Chicago, common	..	19	19
Standard Gas & Electric of Chicago, preferred	6	39	39
Tennessee Railway, Light & Power of Chattanooga, common	..	2	2
Tennessee Railway, Light & Power of Chattanooga, preferred	6	6	6
United Light & Railways of Grand Rapids, common	4	25	25
United Light & Railways of Grand Rapids, preferred	6	63	..
Western Power of San Francisco, common	..	17	17
Western Union Telegraph of New York	extra	80	82
Industrials—			
Electric Storage of Philadelphia, common	4	105	107
General Electric of Schenectady	8	170	175
Westinghouse Electric & Mfg. of Pittsburgh, common	7	52	53